Products Finishing

CLEANING
PLATING
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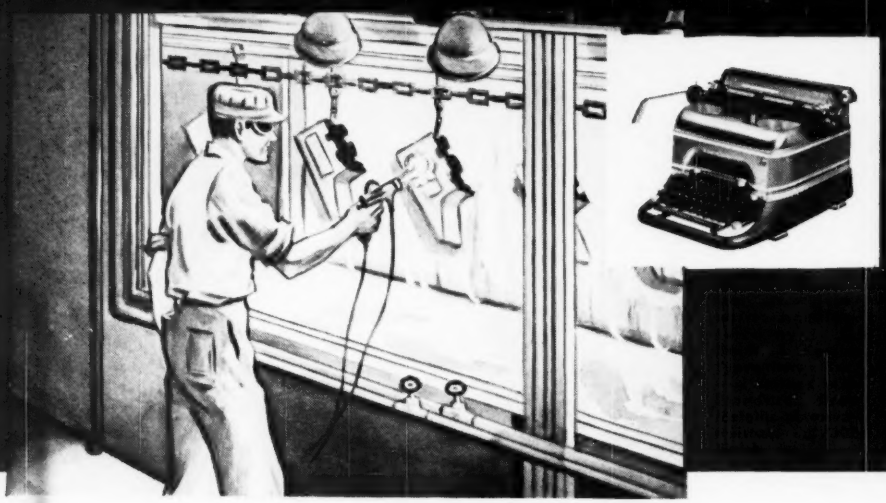
FINISHING

JANUARY 1950



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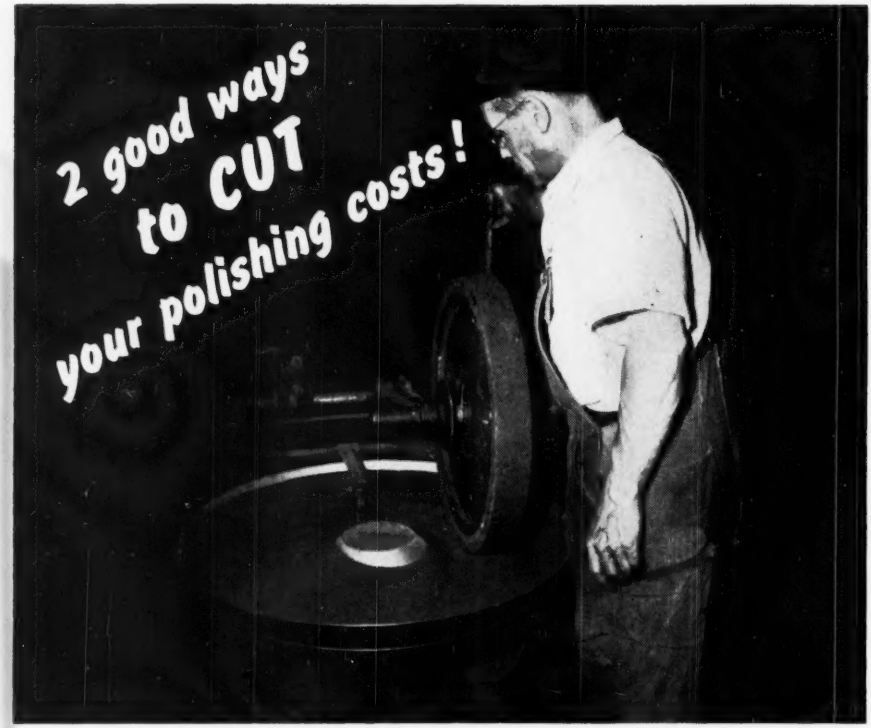

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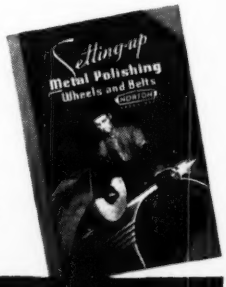

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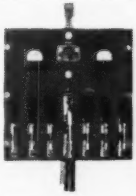

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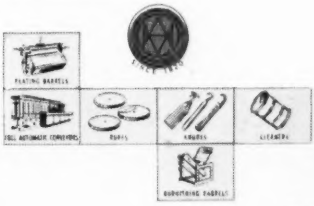

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Products finishing Contents

Volume 14 JANUARY, 1950 Number 4

The Look Ahead 11
Editorial

How Yale & Towne Finishes Materials Handling Machinery 12
By William F. Sorenson

Fine Watch Dials Demand Exacting Craftsmanship in Fabrication and Finishing 21
By Theodore R. Schwalm

Finishing Clinic 32

Aluminum—Its Surface Preparation and Finishing, Part III 36
By E. R. Yarham

Spotlighting Finishing Progress
By Dr. Allen G. Gray

—**Heat Treatment of Chromium Plate** 50
—**Amorphous Phosphate Coating for Aluminum Alloys** 60
—**Electropolishing Brass on a Production Line Basis** 70
—**Surface Reproduction With Three-Dimensional Effect** 74
—**An Improved Anode for Alkaline Tin Plating** 78

Practical Applications of Modern Products
—**High Speed Continuous Spray Pickling Machines Process Brass at New Scovill Continuous Strip Mill** 82
—**Permanent Record of Oven Temperatures Obtained with Traveling Oven Thermometer** 83
—**Three Complete Finishing Systems Combined to Speed Up Oliver Tractor Production** 84
—**Plastic Coating Protects Silver Plated Terminals and Armatures** 86

News of the Industry 88
Finishes That Aid in Appearance and Utility ... 102
New Equipment, Materials, Processes 106
The Finishing Touch 124
Opportunity Section 125
Catalog Library 126
Index to Advertisements 128

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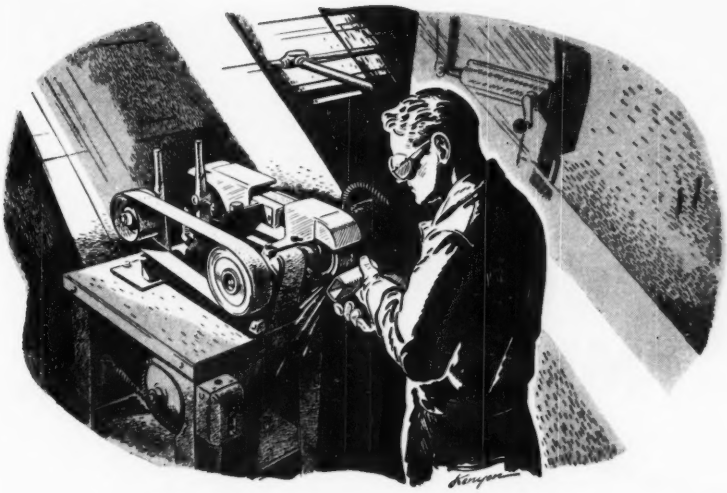

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Pf editorial

Vol. 14, No. 4

JANUARY, 1950

The Look Ahead

It is traditional for business executives, at the beginning of the year, to study business barometers and indices with increased interest, and to give ear to business forecasters, in order to attempt to interpret the general trend of business activity and formulate proper production and sales policies for the year ahead. The general concensus of opinion seems to indicate that in 1950, competition of a full share of the market, consumer or industrial, will be increasingly keen.

Such a situation places more than the usual emphasis on quality of product as exemplified in performance, and in the attractiveness and durability of the finish applied to the various parts of the product. Hence the finishing supervisor and process engineer become increasingly important members of the production organization, since they are largely responsible for the "sales appeal" imparted to the product by the finish.

Finishing executives, in the face of the present competitive situation, must redouble their efforts to produce the most attractive and durable finish for each product at the lowest cost. In the pursuit of such a finish, they must continually seek and investigate the new developments of finish manufacurers, the new machinery and equipment developed for finish application, and the new methods and processes by which new and unusual effects may be obtained. Equipment manufacturers, plating chemicals and process suppliers, and finish manufacturers can be counted on a continue to develop (and report to the finishing industry) new facilities, through the use of which the peak operating efficiency of the finishing department may be reached, and finishes of maximum attractiveness and usefulness may be produced.

For those companies and individuals who search out and try the new developments, by means of which to improve their products and processes, "The Look Ahead" will continue to reveal bright prospects for the success of their enterprises.

E. A. Blount

How Yale & Towne Finishes Materials Handling Machinery

By WILLIAM F. SORENSON

Chief Metallurgist and Controller of Product Finishes
The Yale & Towne Manufacturing Company
Philadelphia, Pa.

THE new plant of The Yale & Towne Manufacturing Company, Philadelphia Division, utilizes decentralized spray booths for painting parts and assembled products, centralized machine tool locations for machining and finishing parts, and an interesting continuous chain plating process for mass plating different sizes of link chain.

Before chain can be plated, however, it is tumbled, and a special room is equipped for this interesting finishing operation. Slugs to be formed into links of chain are tumbled before being formed to remove scale, give a more uniform surface, and provide better contact when welding. After the slugs have been formed and welded to form links of chain, and the chain has been heat treated, the chain is tumbled bright prior to plating. The tumbling room houses 8 tumblers which rotate at about 32 r.p.m. When a tumbler is loaded, the operator sets a marker which indicates how many lengths of

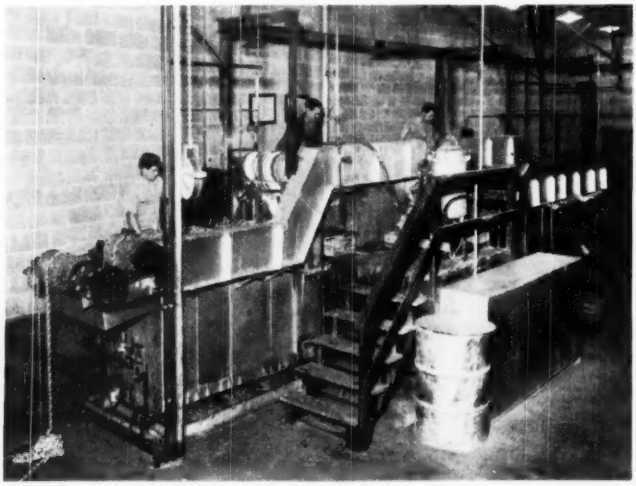

Fig. 1—A view of the automatic zinc plating installation used to plate chain for Yale and Towne equipment

chain are being tumbled, and exact tumbling time is regulated on this basis.

Figure 1 shows an overall picture of the chain plating equipment. With it, chain for operating hand and electric hoists is plated with zinc 0.00032 to 0.00055 inch in thickness.

Figure 2 is a schematic diagram indicating the plating steps. The plating machine is equipped with pulleys to handle ¼, 9/32, 5/16, 3/8, 7/16, ½ and 9/16 inch chain. Depending on the chain size, the speed at which the chain travels is varied. For example, a ¼-inch chain travels 16 feet 3 inches per minute whereas a ½-inch chain travels but 13 feet 7 inches per minute. When double lengths of chain are plated, the speed is further reduced. Double lengths of ½-inch chain, for example, travel at 11 feet 6 inches per minute. Figure 3 furnishes details and dimensions for threading chain through the plating machine.

The new Yale plant covers some 16 acres, and in it are produced hand and electric hoists, scales, hand lift trucks, and gas and electric industrial power trucks. Each product is painted in special spray booths close to the area in which it is produced to save transportation to a central spray booth, because of the great difference in the physical characteristics of the various products, and to limit spray booth congestion.

In Fig. 4 the head of a scale is being sprayed. The Yale scale is gray in color and has a mottled appearance. To achieve this appearance, Sherwin-Williams Dimenso is used, NH-1873 forming the background and NH-2035 the accent. A special spray gun is used to apply both background and accent in one spraying. Each paint is contained in a half-moon shaped tank. The two half-moon shaped sections fit into a regular cylindrical container. Two paint hoses carry the paints to the spray gun. The two paints do not mix until they reach the barrel of the gun, at which time they are sprayed directly onto the piece being painted. Visible in the illustration are the exhaust duct, water spray, lighting equipment, and two spray guns equipped with small paint containers.

After spraying, pieces are placed on the shelves of a 5 foot-high rack and

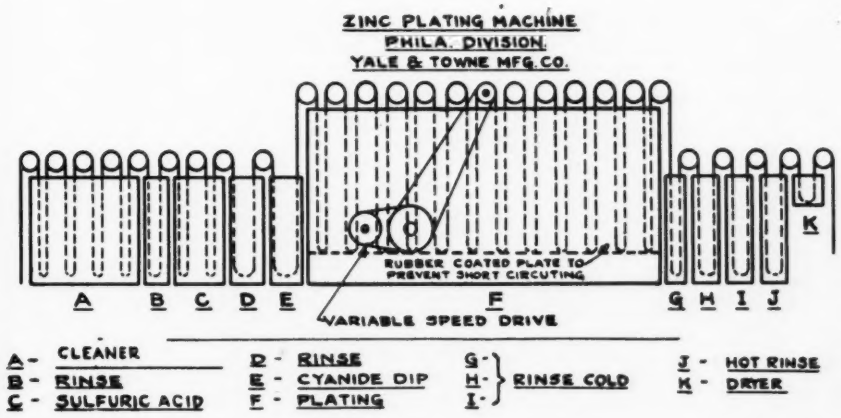

Fig. 2—The steps in the zinc plating cycle are outlined in this diagram. Also, relative time for the various processing steps can be estimated from this figure.

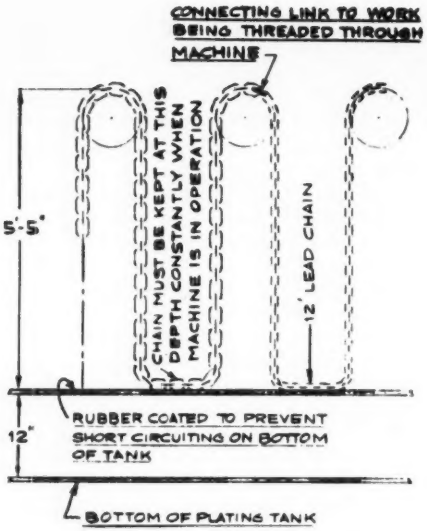
CONNECTING LINK TO WORK BEING THREADED THROUGH MACHINE
CHAIN MUST BE KEPT AT THIS DEPTH CONSTANTLY WHEN MACHINE IS IN OPERATION
12' LEAD CHAIN
5'-5"
12"
RUBBER COATED TO PREVENT SHORT CIRCUITING ON BOTTOM OF TANK
BOTTOM OF PLATING TANK

Fig. 3—Illustration shows in detail how chain is threaded through the automatic zinc plating machine.

pushed into a Gehnrich oven where they are baked for 30 minutes at a temperature of 275-300 deg. F. The oven has been altered so that it exhausts from the bottom instead of the top, temperature being equalized by a circulating fan at the top. This prevents pieces near the top from burning and assures complete curing of pieces near the floor of the drying oven.

Small parts, such as ratchet-hoist handles, small chain-hoist housings, and hoist hooks, are sprayed with an air-dry green or orange enamel in a booth similar to the one in Fig. 4. The booth differs, however, in that an overhead monorail chain conveyor travels through it. Assemblers hang parts on the conveyor which conveys them into the booth for spraying and then up near the plant ceiling for drying. The conveyor is 430 feet long and travels from 2.5 to 7.5 feet per minute. As the conveyor travels down from the ceiling to plant working area level the

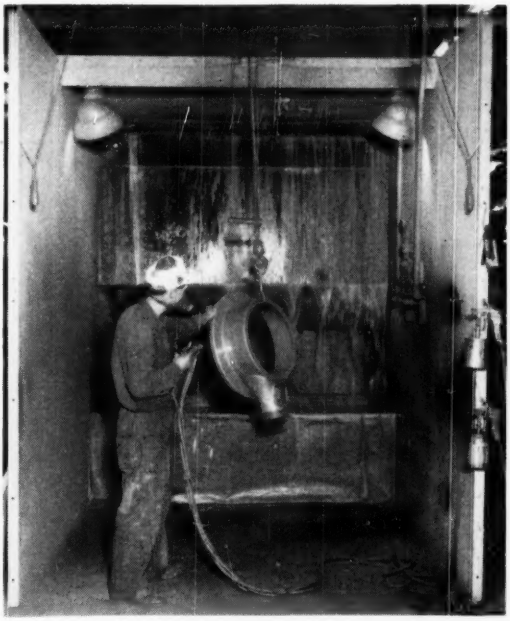

Fig. 4—A view of one of the many spray booths used for spray-painting Yale and Towne products. Here an operator is applying a special gray paint. Paint overspray is exhausted through the water curtain at the rear of the booth, after which the paint-free air is expelled from the plant.

dry parts are removed and placed in skid bins to be taken to temporary storage. By using the conveyor, parts need not be stored while drying and need not be handled to or from drying areas. A wire mesh guard under the conveyor eliminates the possibility of parts falling and hitting employees. Cardboard in the bottom of the guard prevents paint from dripping onto the floor or onto personnel.

Figure 5 shows another spray booth equipped with an overhead endless I-beam on which are 13 trolley-mounted hooks. Castings are hung from these hooks upon being brought to the booth and are prime coated and pushed on, one right after another, without involving any delay. The paint container incidentally, is handled by a fork truck. It rests on a skid which is readily picked up and transported by an industrial fork or platform truck. The prime coat is used as a paint base and to prevent rust while parts are in storage prior to machining. The primer has more pigment and less sheen than the enamel used on the finished products.

Figure 6 shows another spray booth, this one for accommodating larger assembled units. On the left, a lift truck is being sprayed, while on the right, small truck components are being sprayed. After spraying, the entire rack is removed by lift truck to a storage location where the parts are allowed to dry prior to assembly.

At present there are seven spray booths in the plant, and paint for each is mixed on location. However, a new system is now being installed which will pipe paint throughout the plant as water and air are now piped.

The system will supply quick drying orange synthetic enamel to all seven spray booths. Paint will circulate through the system at a rate of 6.5 gal./min. at a velocity of 1.2 ft./second. A pump operating at 70 p.s.i. will force the fluid through 3200 feet of 1¼-inch copper pipe. 204 gallons will be in the pipes at all times and pipes will be fed from two 200-gallon containers. If all spray booths are in operation at once, the system will be supplying paint at the rate of 2 gal./minute.

Two containers will be on hand, one to supply paint, the other to go into service when the one in use becomes empty. Prior to installation, containers of paint will be agitated. Contain-

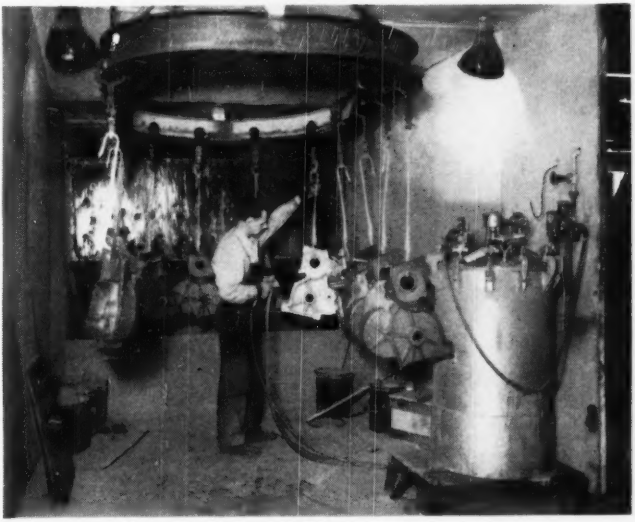

Fig. 5 — A view of a water-wash spray booth in which an overhead I-beam has been mounted to facilitate rapid paint spraying of some of the heavier parts

Fig. 7—Photo shows interior of a large shotblasting room, with outer doors open. Room is lined with tough steel, and heavy glass protectors prevent breakage of the light bulbs. Operator is supplied with fresh air constantly.

ers will be laid on their sides between 2 parallel sets of rubber tired wheels. The wheels will be rotated and will in turn rotate the containers, thereby agitating the paint.

The new system will ensure a uniform color, paint will be well agitated, and waste will be decreased. To ensure quality, the specific gravity and color will be tested four times per day.

In direct contrast to its decentralized spray booths, Yale has centralized its machine tools for performing finishing operations. Formerly, at the old plant vacated in January 1949, each department had its own tools. However, this resulted in unnecessary duplication of equipment and operators, excessive idleness of equipment in some cases, and difficulty in standardizing procedures and quality of work.

Several thousand machine parts go into the various Yale materials handling products and many of these require one or more mechanical finishing operations. Shafts must be

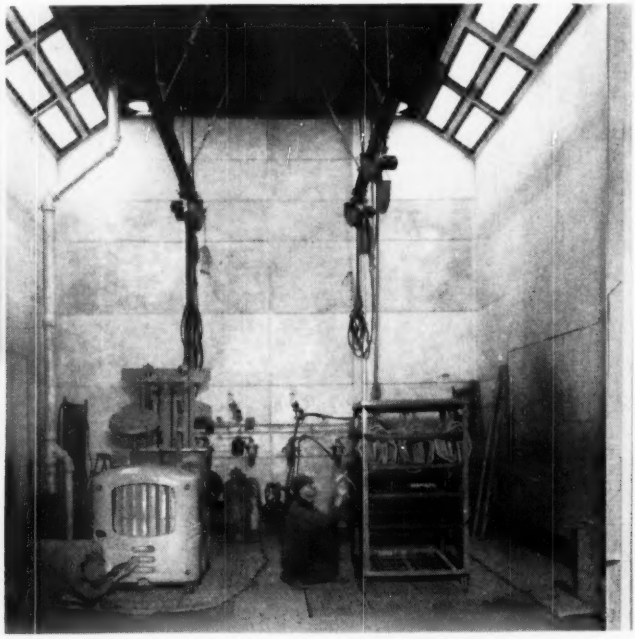

Fig. 6—In this large, room-type, well-lighted, bottom exhaust spray booth, large assemblies, as well as racks of smaller parts, are coated with air-dry enamel.

finish turned, holes must be reamed and broached, gears must be shaved and burnished, and many other parts require mechanical finishing operations of one kind or another.

Figure 7, for example, shows one of two large Pangborn units for shotblasting. Shotblasting, of course, follows chipping and grinding operations which are performed in the snagging room. Here, slag is removed from welds and corners are smoothed. In the shotblasting illustration a weldment is being cleaned with No. 40 grit prior to machining, assembly, and painting operations. Shot falls through the floor grating and is reused. Dust is drawn off through the louvers in the back of the unit and is exhausted. In addition to the two large shotblasting units, smaller sandblasting equipment is situated in the heat treating room.

Figure 8 shows a four-stage conveyor-type washing machine situated in the heat treating room. All machined parts are spray cleaned in this machine. In the first stage "De-Solv-Al" M-145 is used 50 to 1; second stage is a cold water rinse; third stage, "De-Solv-Al" 100 to 1; fourth stage, a hot water rinse. The cleaning material, a product of A. J. Stull & Co., is a modern type emulsified cleaner and degreaser and is especially recommended for cleaning before painting. Parts may be routed through the cleaning machine several times after various machining operations. Small parts are conveyed through the washer in baskets while larger parts are placed directly on the cross-rod conveyor.

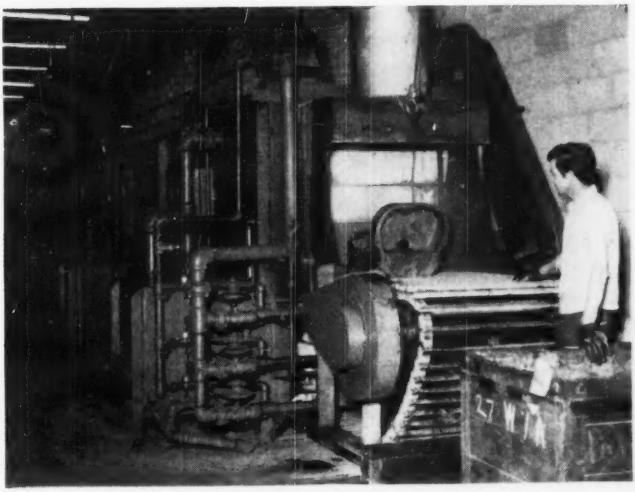

Fig. 8—A four-stage, conveyorized washing machine designed to remove contamination resulting from machining and other processing operations

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Platinum and palladium are among the most ductile metals and may be beaten into leaf 0.00002 inch thick. Platinum may be drawn to wire of 0.00001 inch diameter, where one ounce will produce 19,000 miles of wire.

Platinum does not oxidize in air at any temperature.

What's known as a wrinkle finish is frequently applied to cash registers, typewriters, adding machines, vacuum cleaner components, furnace jackets, aircraft instrument panels, and electric fans. Coating such objects with wrinkle enamel has become widely established and accepted among hundreds of product finishers because of its appearance and serviceability. After being properly prepared and sprayed into a surface, the object to which it is applied is baked at high temperature.

Do you have METAL SURFACE TREATMENT PROBLEMS ?

Here are PARKER products to solve them

All of our work is on the surface! For 34 years we've lived with the problems of metal surface preparation and preservation. Parker research has discovered how to deal with many specialized problems; field experience for three decades and in thousands of plants has taught us many answers, too. Parker Rust Proof Company's vast experience, and the famous Parker Products, are at your command to solve *your* metal surface treatment problems.

Want to inhibit rust?
...PARCO COMPOUND

This is an improvement on the original Parker Product, which has set the standards for controlling rust on iron and steel for more than thirty years. Parco Compound converts the surface of these metals to a nonmetallic phosphate coating that is highly efficient in inhibiting the forces of corrosion. It's an easy, positive treatment, requiring only simple equipment.

Parco Compound treats small and large pieces with equal ease. The characteristic color produced by Parco Compound is soft, dark gray. Parcolacs, paint, oils, stain, or wax finishes are used over this versatile rust inhibitor.

Want rust preventive finishes?
... PARCOLACS

This large class of specialized products includes waxes, stains, and oils of varying characteristics to meet the many different requirements of industry. There are Parcolacs for dip application, for centrifuge, for brushing and spray. You can get high

efficiency in Parcolacs for use as rust preventive finishes; others have been developed to add pleasant, non-marking, high appearance qualities. Your own requirements will dictate which Parcolac is best for your use.

Want improved paint adhesion and rust resistance? ... BONDERITE

Most widely used of all Parker Products, Bonderite adds quality to many of the most attractive metal products manufactured today. It's under the paint on automobile bodies, fenders, and sheet metal. It is used by most refrigerator manufacturers, and on a great many of the finest domestic appliances. Wherever lasting fine appearance is important on a painted metal product, *there* is a place for Bonderite.

Bonderite converts the surface of metal to a nonmetallic phosphate coating which is an excellent base for paint and, because of its nonmetallic character, an effective rust resistant.

Bonderite is fast and flexible, and can be used in immersion equipment and in automatic conveyor production lines. It is simple to control, producing positive and uniform results at low cost.

Want faster, smoother draws? ... BONDERITE

The crystalline, nonmetallic Bonderite coating brings these benefits to the drawing bench: It holds lubricant, even under great pressure. It prevents metal to metal contact, reducing galling and scoring. It reduces wear on tools and dies, lengthening the life of these expensive parts. It permits deeper, smoother, faster draws. *Cuts metal polishing costs.*

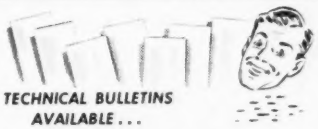
Want wear resistance for friction parts? ... PARCO LUBRITE

Faster, smoother break-in, greatly reduced danger of scoring and scuffing, and longer subsequent wear are the advantages Parco Lubrite brings to friction parts. The nonmetallic, crystalline coating holds oil under high operating pressures and temperatures. There's no metal-to-metal contact, and the parts "wear-in" quickly and smoothly.

Want better metal cleaning and rust removal? ... PARCO Formulated CLEANERS

Parco Cleaners are formulated to clean better, go farther, with reduced concentrations of cleaner material required. These products do more than remove rust, soil, or grease; they also *condition* the metal for the next step in finishing.

Parco Cleaners include *Solvent and Emulsion* Types, *Acid* Types, *Alkaline* Types, and *Water Conditioners.*



TECHNICAL BULLETINS AVAILABLE ...

Full information on any of these Parker Products is yours on request. Write for technical bulletins on the Parker Products which can contribute to the solution of your problem and the success of your product.

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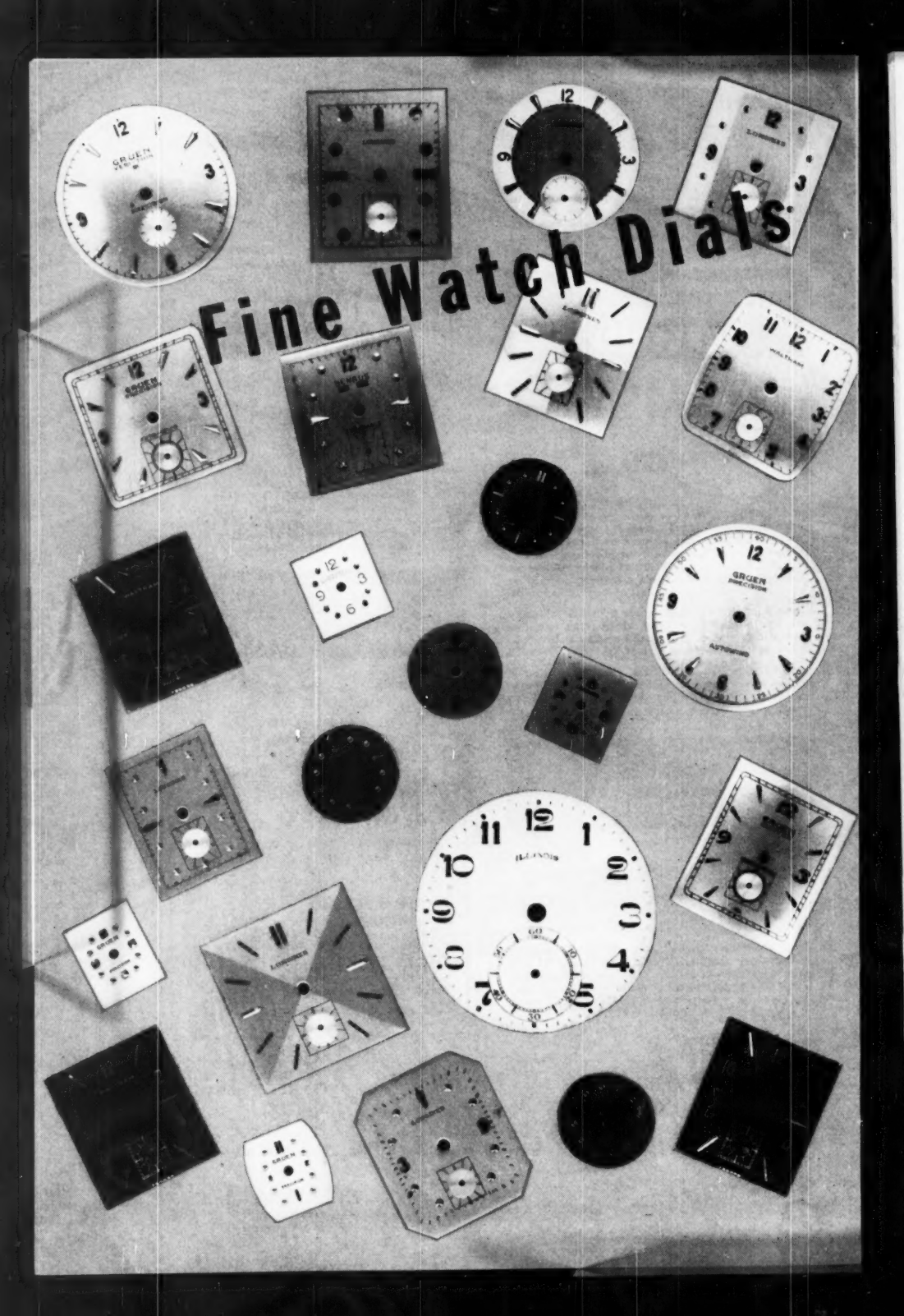
Fine Watch Dials

Demand Exacting Craftsmanship in Fabrication and Finishing

Pleasing contrast and novel effects are created on watch dials by a combination of mechanical and chemical finishing processes, one of which is a newly-developed black nickel plating process, in the plant of Theodore R. Schwalm, Lancaster, Pa. In this article Mr. Schwalm outlines the manufacturing and finishing techniques which build quality and consumer demand into his products.
—The Editors

By THEODORE R. SCHWALM

THE story of watch dial manufacture is one of precision manufacturing methods from the first operation performed on a brass or silver blank to the final finishing operation. Watch dials are sold to watchmakers and jewelers, and these customers expect the same accuracy and attention to detail in the finished dial that is required in the watch movement. Therefore, to satisfy customer demand, no detail that would improve mechanical accuracy is overlooked. Machines are selected with great care; dies, jigs, and fixtures are designed and manufactured to close tolerances; fabricating methods are kept under continuous surveillance, and rigid inspection applied to the finished products. Under these conditions orders for from one to 100,000 watch dials can be filled with the assurance that the customer will be pleased with the finished products.

Dial Fabrication

Coiled strip stock of brass or sterling silver is the raw material generally used in dial manufacture. Using specially designed dies, the strip stock is blanked as the first operation in a series of smoothly-flowing, logical steps in the production of the completed dial. Dial centers are pierced and foot locations marked. Feet (usually two per dial) are staked and silver soldered in place. Next, a die operation is used to true the feet and check curvature of the dial face. This operation serves also as a check on improper soldering of the feet. Dials which pass inspection at this point are routed to the finishing department for further processing.

Dial Finishing Methods

Brass dials are silver plated in the conventional plating solution, or given a white pebble finish as hereinafter described. In any case the finishing process begins with a polishing operation on a medium-hard felt wheel, set up with 320 emery, followed by a buffing operation on a medium-loose buff, using tripoli, and a final buff on a soft muslin wheel using rouge composition. All three operations may be performed on one buffing lathe because the felt wheel and the two buffs are mounted on the shaft of a small lathe. Eight-inch wheels are used, and shaft rotation is approximately 2800 revolutions per minute.

Dials scheduled to receive a Butler

finish may be processed so that the lines in the satin finish run horizontally, vertically, or at an angle, or in any number of combinations of these finishes. Brass dials, after polishing and buffing, are properly arranged on a gutta percha pad and brushed, under a water spray, with a brass wire brush (0.003-0.005 inch bristles) using 4/0 pumice. Dials are racked quickly on small plating racks, rinsed, plated 10 seconds in a conventional silver strike solution, plated 30 seconds to 1 minute in a silver plating solution at 1½ volts, rinsed, and brushed again in the same direction as before, using 4/0 pumice and soap bark as a lubricant.

When combinations of line finishes at various angles are specified, dials are finished as before, and are then printed with zone lines so that areas which have been finished may be covered with a black auto lacquer, (the printed transfer lines serving as stop-off guides) and thus protected while other areas are finished. After the second finish has been applied, the lacquer is removed from the unfinished areas and the dial is then ready for further processing.

Sterling silver dials are Butler finished by polishing and brushing methods similar to those described for brass dials. The silver plating operations are the same as for the brass dials.

Further processing depends on the final finish specified for the dial. If the finish is to be yellow gold, green gold, white gold, or rose gold, then the silver brushed dials are gold plated and dried. If silver is to be the final finish, then drying follows the final brushing operation. Drying is accomplished, after a final water and alcohol rinse, by placing the racks of dials in a Kreider centrifugal dryer fitted with an electrical heating element which can be regulated so as to provide just the right amount of hot air to accomplish the drying operation without leaving

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GLOVE COST ~~$9.90~~
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stains on the delicate object being dried. This is a rather unusual application of the centrifugal dryer, since it is usually used to dry a basket load of small parts which have been barrel plated. In the drying operation used for watch dials, the plating racks are held against the sides of the rotating basket by centrifugal force, and the delicate watch dials are not damaged. Dry dials are printed, lacquered, or further processed.

If gold figures and markings are specified for a silver dial, the following process is used:

1. Polish, as described above.
2. Gold plate in proper type of gold solution.
3. Chromium plate, at 50 amp./sq. ft. for 8 minutes, in the usual chromium plating solution, operated cold. The dull gray plate serves to facilitate the printing operation.
4. Rinse and dry.
5. Print with special ink, transferring the impression from an ink-filled, hand-cut steel engraving, by means of a glue-gelatin transfer pad, to the chromium plated watch dial.
6. Strip chromium plate in hydrochloric acid.
7. Brush under water as described above.
8. Silver plate.
9. Brush again to produce desired Butler finish.
10. Strip stop-off lacquer from figures.
11. Strip chromium plate from figures. This reveals gold figures against brushed silver dial face.
12. Dry and print again to outline figures.
13. Coat with clear lacquer and air dry.

Dials marked to receive a snow white matte silver finish are polished and buffed as described above, and then hand brushed, under a water spray, with a mixture composed of 1 part silver powder, 20 parts salt, and ½ part cream of tarter. A circular brushing motion is used. The exact size of grain obtained (in this immersion silver deposit) and the appearance of the finish depends upon several factors such as the amount of compound used, the size of the brush, the size of the bristles, and the time and technique of brushing. The finish desired displays the appearance of very small grains. Usually, the longer the operation is carried out, the larger are the grains produced. By means of this hand operation, 400 to 500 of these dials, mounted on a gutta percha pad, can be finished in an hour by one operator. After processing, dials are dried, lacquered, printed, and so on, according to the final results desired.

Black Nickel Plating

Black nickel plated, lacquered watch dials with contrasting gold figures, obtained either by printing or mechanical application, produce particu-

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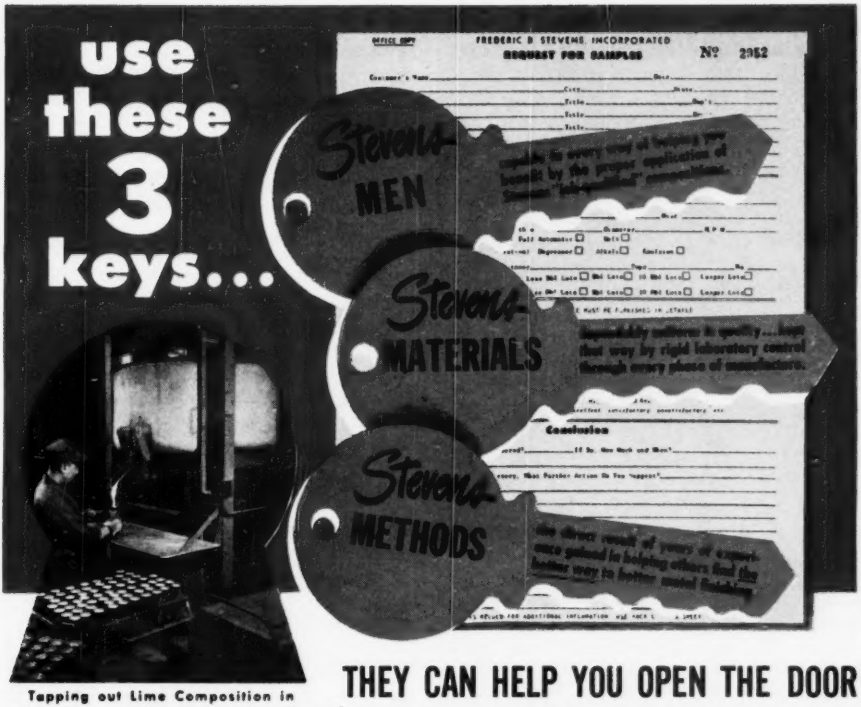

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The structure of any business if it is to endure, must be solidly built on a firm foundation of men, materials and methods. On this foundation, for more than half a century, Stevens has built carefully and effectively to qualify as *the* organization most capable of helping you improve your metal finishing production through the use of better Polishing and Buffing compositions.

Experienced, responsible metal finishing operators recognize this capability in their first contact with a Stevens representative . . . by the manner in which he justifies his recommendations of a Stevens "job-qualified" composition . . . or, by the manner in which he qualifies his request to our laboratory for a polishing or buffing compound especially formulated to do the job.

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METAL FINISHING EQUIPMENT AND SUPPLIES DIVISION

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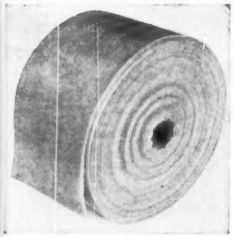
larly pleasing effects, and this is one process to which the Schwalm organization has made a contribution. A new black nickel solution, developed by the company, exhibits several advantages over the conventional black nickel bath. The ordinary black nickel bath must be operated below 65 deg. F. and parts must be plated for 8 to 15 minutes to produce an acceptable plate on watch dials. There is occasional difficulty with peeling, blistering, and good adhesion at the junction between the plate and the stopped-off areas. With the new black nickel plating solution, temperature is not critical, an excellent jet black plate is developed in 2 to 3 minutes, there is no peeling or blistering, and sharp definition between figures and dial face is obtained. When dials are lacquered after plating, a velvet jet black finish—ideal for two-tone work—is obtained.

The process cycle for producing the new black nickel finish on watch dials is as follows:

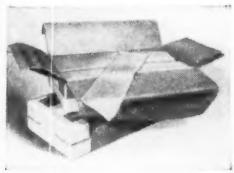
1. Polish and buff the brass dial as previously described.
2. Brush with 0.003 inch diameter brass wire brush and 4/0 pumice under water spray.
3. Gold or silver plate, as required.
4. Print figures on dried dial as described, unless applied gold figures are to be used.
5. Clean in a special soak cleaner composed of alchol, ammonia, Orvus, and water, and brush with a 4-stripe soft watchmaker's brush.
6. Water rinse.
7. Black nickel plate 2-4 minutes at 1½ volts (very low current density) in the following solution operated at room temperature:

Nickel ammonium sulfate	10-12 gm./l.
Zinc sulfate	2-4 gm./l.
Sodium thiocyanate	15-18 gm./l.
Standard silver plating solution	1-2 cc./l.

(exact amount not critical)



IN ROLLS
Cut off any size piece and use as needed.



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"Duck Turns 'Guinea Pig' and proves a point for *Flock!*"

The bill is plastic, the head and body are glass and the overshoes are metal—yet to all three materials, Flock "takes" as ducks take to water! Flock gives the overall effect one of realism, high color—and functionally performs the desired action. The flock-coated head retains the right amount of moisture necessary for evaporation. Without going into technical details, it is important for its fascinating operation that the duck's head be wet — continuously evaporate—cause temperature differences—and make the duck go into its bobbing act! Claremont Flock is a proven medium whether for novelty or industrial purposes. Investigate its possibilities.

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Claremont Flock is available in bulk, in colors, in quantity for special spraying — on finishing purposes. Write for samples, color charts, prices, details. Inquiries invited.

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1935 ELM STREET CLAREMONT, N. H.

An addition of 1-2 cc./L. of the standard silver plating solution is made to the black nickel solution after 3,000 to 4,000 dials have been plated.

8. Water rinse.
9. Strip ink in acetone.
10. Dry in Kreider dryer.
11. Coat with Agateen water white clear lacquer and dry.

Since the objects being plated are so small, extensive plating facilities are not required. The solutions used are operated in 6½-gallon ceramic tanks and 10-gallon ceramic jars. Power for the plating operation is supplied by a 150-amp. rectifier. So little steam and other fumes are generated that special exhaust equipment is not used, normal ventilation facilities being entirely adequate. Undersirable fumes from the cold chromium plating bath are controlled by H-VW-M Chrome Spray Floats—plastic tubes or pellets which float on the solution surface.

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cleans spray booths quickly, economically, safely!

Spray Boothcote on clean booth. Surplus paint can then be peeled off in sheets by any operator.

- Saves time and labor
- Time-tested; used for 11 years
- Mixed—ready to use

- Can be brushed or sprayed
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Money back trial offers: 5 gals. $6.25 f.o.b. Buffalo or write for Circular.

Distributors! Write for open territories.

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Numeral Fabrication and Assembly

Figures and decorative markings for applied gold figure dials are fabricated from 14 to 18-karat gold, and assembled to the previously finished and lacquered watch dials. Figures are blanked from flat stock in dies, made with very close tolerances. Foot locations are swaged, and feet attached. Then a number of figures are mounted on small linoleum-covered nickel-base pads, and polished by hand, using a circular rotational motion, on three successively finer India stones, after which they are polished on a jasper stone. This treatment imparts a mirror finish to the gold numerals, and prepares them for assembly to the dial in question.

Decorative markings, such as trylons, dots of various kinds, pyramids (square dots), and so on, used in place of figures on some watch dials, are blanked much the same as figures. Then the gold parts are machined with diamond tools in jewelers' lathes and shapers, so that precise angles may be secured, and all parts will be exactly the same. The diamond tools produce a mirror finish on the gold, so that no polishing or buffing is required.

Dials which are designed to receive the applied figures are drilled with the aid of a drilling template, using drills varying from 0.007 inch to 0.019 inch in diameter, depending on the size of the feet in the figures to be applied. The proper numerals or markings are then inserted, and the protruding points are ground off with a dental grinding wheel which peans the metal of the feet into the metal of the dial, and thus holds the figures secure.

In addition to the dots applied to dials, reverse dots, cut into the dial surface yet presenting the appearance of applied dots, are also used. A diagonal diamond tool is used for this machining operation.

Worthy of note in the fact that, when machining operations are to be

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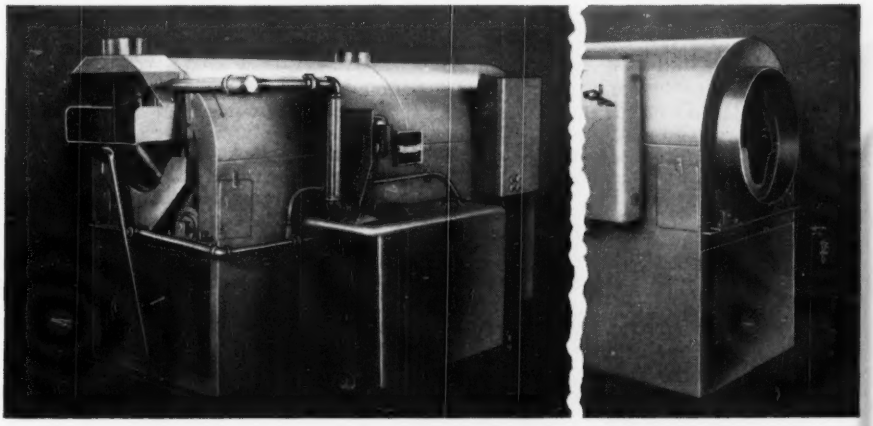

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that ideally serves plants of all sizes for the most efficient and satisfactory cleaning of STAMPINGS, SMALL CASTINGS, SCREW MACHINE WORK.

LIMITED TIME OPPORTUNITY!

Orders placed in time to participate in concentrated manufacturing schedule of this Standard Washer will be subject to a special discount made possible by group production. A Ransohoff representative will gladly give you full details of this special opportunity.

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performed on dials, they are coated with a heavy coat of clear lacquer to furnish protection during processing. When the operations are completed, the heavy lacquer is removed and replaced with the normal final coat of clear lacquer.

Special Dials

Almost any dial may be reproduced by photoengraving and copper-plate etching, if the design of the dial is such that these methods may be used. Thus, dials for very old watches may be made on special order.

Dials are also produced by combinations of printing, etching, and finishing processes which will produce dials with etched faces or etched figures as desired.

As can be seen from the examples cited, the number of different watch dials that can be manufactured is almost infinite, limited only by the imagination of the watch designer and the demands of the buying public. In all cases, however, the finished products must be accurately made and attractively finished to be acceptable.

New electronic devices that finish cars automatically—and even make the coating go around corners to cover the back areas—are being adopted in a growing number of automotive plants. Automatic paint spraying equipment is now used in a number of plants for car roofs, hoods and other parts. The paint spray gun moves up, down, and sideways under control of a battery of electric eyes. Depth of the paint is regulated by electronic devices. To make paint travel around corners and reach hidden surfaces, an "electrostatic" painting process is used. The car parts which are to be finished are passed through an electric grid, which is given a high-voltage negative charge. Paint sprayed into the space between the car parts and the grid also is given a negative charge, which makes the grid repel the paint and causes the car part to attract the coating material.

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SAVE ON WHEELS . . . STEP UP PRODUCTION

Speeds from 1,500 to 3,000 RPM are instantly available with the turn of the dial while the lathe is in operation. Polishing and buffing (cut-color-satin) can be done on one machine with no delays or lost motion.

The Hammond VRO Variable Speed Polishing Lathe definitely will step up production and improve finish. Maximum wheel economy is assured, too, because efficient peripheral speed can be maintained at all times — wheels can be used right down to the flanges before discarding.

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VARIABLE SPEED

POLISHING AND BUFFING LATHE

the DIAL does it

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Catalog showing all Hammond polishing lathes, abrasive belt, "OD" and automatic finishing machinery gladly sent on request. Write today!

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Finishing Clinic

In this department are presented some of the questions submitted by readers together with suggested solutions of the problems outlined.

Question. *We will appreciate any information you can furnish concerning the anodic rubber plating process.*

F.R.

Answer. The electrophoretic deposition of rubber is particularly adapted to the coating of articles of intricate shape, as the solution shows a high throwing power. It is used for coating a wide variety of objects such as wire screens, sieves, fan blades for the circulation of corrosive gases, racks for use in electroplating, metallic baskets, and so on.

The latex mix, which may contain 35 per cent by weight of rubber, also contains accelerators, sulfur, zinc oxide, and other materials, all of which migrate to the anode, are homogeneously incorporated in the deposit, and serve their usual functions. The anode compartment contains the ammonia-latex mix and the article to be coated and is separated from the cathode compartment by porous diaphragms. The catholyte is slightly alkaline water. The pH must be correct. If it is too low, the deposits are soft and may crack on drying. If too high, they have too high an electrical resistance and may overheat. Zinc is preferred as the anode material, but other materials may be used. When an e.m.f. is applied, zinc ions pass into the solution and neutralize the rubber particles, which precipitate on the anode. Deposits contain about 40 per cent water, sufficient to maintain the conductivity of the deposit and to permit deposition to continue. Current densities of 7 to 20 amp./sq. ft. are common, at 10 to 100 volts, to produce deposits $\frac{1}{32}$ to $\frac{1}{8}$ inch thick. Higher current densities produce smoother deposits and show better throwing power, but they cannot be used for appreciable lengths of time because of excessive heating due to high resistance in the fresh rubber de-

posits. Deposition may be carried out at as high a rate as four grains of dry deposit per ampere minute, a rate more than five hundred times as fast as that normally employed for zinc. After drying, the deposits are vulcanized in the usual manner to any desired cure.

——— fc ———

Question. *We have noted with interest the question on hot dip tinning in the "Finishing Clinic." Can you tell us if any method has been devised for hot tin coating aluminum wrought or sand-cast parts? The parts we have in mind will weigh not more than an ounce or two.* *C. A. B.*

Answer. Small objects of the wrought aluminum alloys 2S, 3S, J51S, 61S, and 63S can readily be hot tinned by the following process: (a) etch in 15 per cent hydrofluoric acid solution, treat with a 25 per cent solution of oleic acid in methanol, and dip in molten tin at 35-450 deg. F.; or (b) treat with Alcoa No. 62 Soldering Flux, with or without etching, and dip in molten tin as before.

——— fc ———

Question. *Can you suggest a method of coloring zinc base die castings?* *J. R. A.*

Answer. The following companies manufacture and market chemicals used for coating zinc with various colors (names of nine companies furnished).

One chemical method of treating zinc die castings consists of a simple dip into a solution which is primarily chromic acid and results in the formation of a golden brown film which usually shows some iridescence.

Zinc may be colored black by immersion in the following solutions operated at 212 deg. F.:

(1) 5 gm./l. potassium permanganate
20 gm./l. copper sulfate

(2) 13.4 gm./l. potassium permanganate
10 gm./l. copper sulfate

Another solution which will form a black stain on zinc is applied with a brush or may be applied by tumbling small articles in a drum containing sawdust moistened with the staining solution and consists of:

125 gm./l. copper sulfate
60 gm./l. potassium chlorate

Another solution which will produce green, red, violet, and brown colors contains:

36 gm./l. copper sulfate
30 gm./l. cream of tartar
130 gm./l. caustic soda

The objects to be colored are cleaned and then dipped in the color solution.

Dark blue coloring is produced by dipping zinc objects in a solution of:

60 gm./l. nickel ammonium sulfate
60 gm./l. ammonium chlorate

The yellow color first produced changes to bronze, violet, indigo blue, and black upon prolonged dipping.

——— fc ———

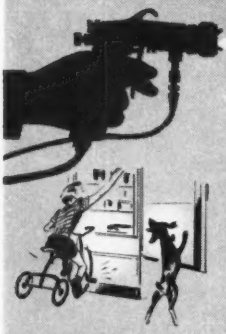
Question. *Please advise us how to remove metallic mercury contamination from a straight cyanide copper plating solution. The impurity is causing a gray-streaked deposit.* *M. G.*

Answer. If possible, pump the contaminated solution into a separate tank and clean out the copper plating tank thoroughly. You may be able to remove some of the mercury by immersion deposition on clean copper wire placed in the copper plating solution. The wire can be cleaned by stripping in the regular nitric-sulfuric bright dip.

Next, circulate the solution through a filter using filter paper and activated carbon. Finally, use dummy cathodes and plate overnight or longer at a low current density.

A GOOD START

...a Stronq Finish!

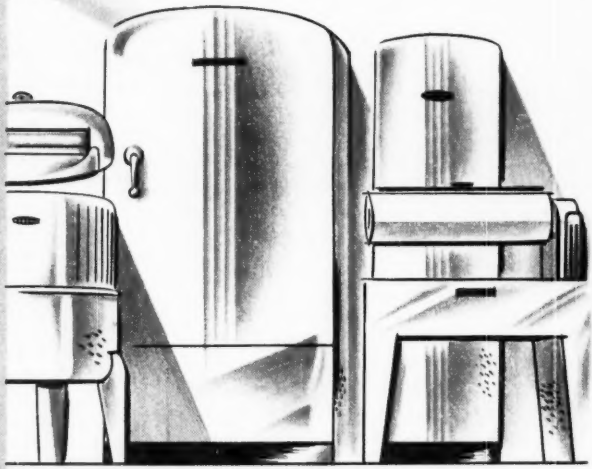


TOUGH AND MARPROOF
Kemclad formulations include special ingredients to protect finish against marring, chipping or scratching.

HOT GREASE? NO HARM DONE!
Even hot grease won't damage Kemclad's gleaming white finish!

STAYS WHITE AND STAIN-FREE!
Kemclad Finishes aren't affected by food acids, weak alkalies, alcohols or other common household chemicals.

CLEANS EASILY . . . SAFELY!
Kemclad's smooth surface cleans easily with damp cloth, but withstands strong detergents safely.

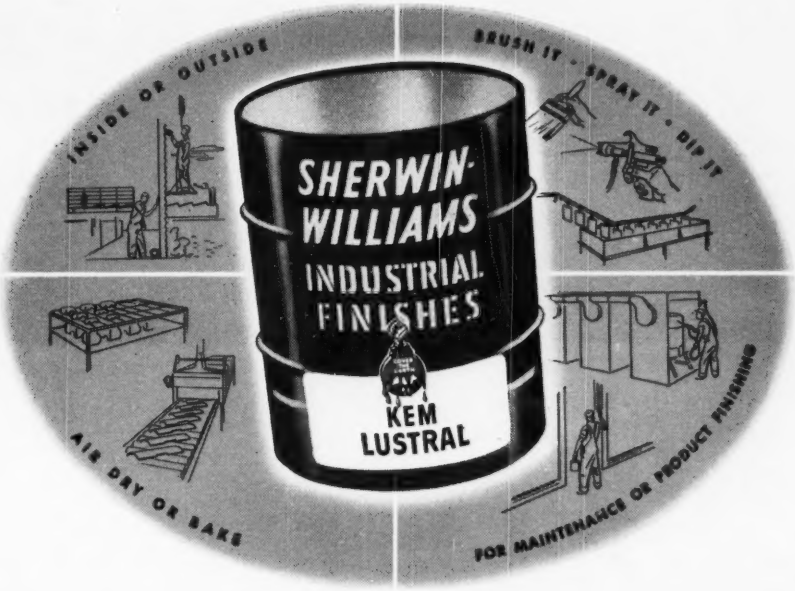


Appliance sales often *start* with the *finish.* They often end there, too, unless the finish has the punishment-resisting, white-for-life beauty made possible by the newest synthetic resin finishes!

Kemclad* Appliance Finishes are designed to adapt these qualities to the specific needs of appliance manufacturers. They provide the permanence and protection against abuse expected by today's buyers. Greater hardness and flexibility enable minor defects to be easily rubbed or "dinged" out after baking. Extremely high solid content with low viscosity give better protection at lower cost per finished unit. Write for details. The Sherwin-Williams Co., Industrial Division, Cleveland 1, Ohio. *Trademark

**SHERWIN-WILLIAMS KEMCLAD*
APPLIANCE FINISHES**

ANOTHER PRODUCT OF SHERWIN-WILLIAMS INDUSTRIAL RESEARCH



How to make *LESS PAINT* do *MORE WORK!*

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Kem Lustral Enamels are stocked, ready-to-use, at your local Sherwin-Williams branch store, in 31 standard colors, plus black and white. You'll find other Industrial Finishes stocked there, too:

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- **OPEX LACQUERS**
- **KEM ARTMETAL (WRINKLE) FINISHES**

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Moneysaving, because they provide the same high-quality pigments and vehicles of the best special finishes obtainable, but at less cost because of large-volume production and nation-wide distribution!

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Another product of Sherwin-Williams Industrial Research

SHERWIN-WILLIAMS INDUSTRIAL FINISHES

Part III—Paint Finishes

By E. R. YARHAM,
Cromer, Norfolk, England

GREASE, dirt, loose deposits of oxide, and remains of former paint coatings must all be completely removed prior to surface treatment, and suitable processes are outlined under "Cleaning and Degreasing" (See Sept., 1949 issue of PRODUCTS FINISHING).

The condition and pre-treatment of aluminum alloy surfaces before painting are of great importance to secure adequate protection and to produce a quality decorative finish. Porosity, blowholes, or inclusions of foreign bodies cannot be easily masked or rendered harmless simply by applying a coating; but isolated surface imperfections can be stopped and porous castings may be effectively sealed. The paint coating must be continuously and intimately united to the metal and must thoroughly cover the metal surface.

The aluminum oxide film thickened by anodizing or by the less costly M.B.V. process forms an excellent key for painting. There are several other processes which are satisfactory as pre-treatments. One of these, the chromic-sulfuric acid process, specifies a period of treatment of approximately 20 min. at 110 to 150 deg. F. using either of these solutions:

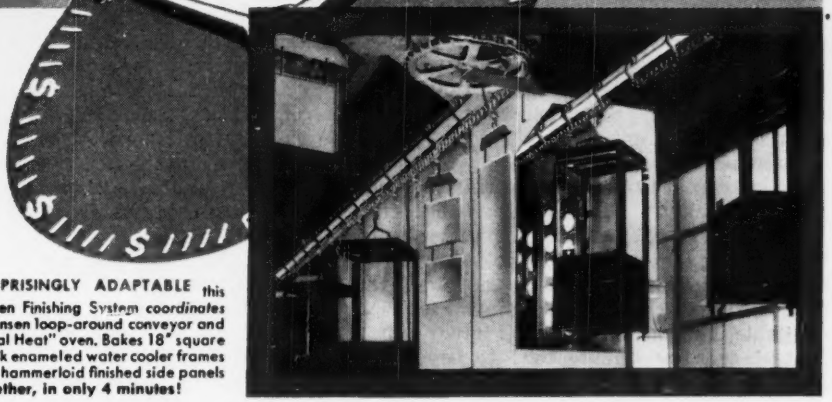
1. Sulfuric acid (sp. gr. 1.84) ----------15 per cent by volume
   Chromic acid ---------- 5 per cent by weight
   Water ---------- remainder
2. Sulfuric acid (sp. gr. 1.84) ----------15 per cent by volume
   Sodium bichromate ----------7½ per cent by weight
   Water ---------- remainder

A sequence of operations for the chromic-sulfuric acid pickling of sheets is as follows:

1. If necessary, degrease in trichlorethylene, liquid or vapor
2. Immerse and swill in alkaline or emulsion cleaning solution
3. Rinse
4. Pickle in chromic-sulfuric acid, using a lead-lined tank
5. Swill in cold running water
6. Wash in hot water
7. Dry by means of hot air

If the water is hard, a thin film of lime may become deposited on the

Finishing Time Saved..IS MONEY EARNED!



SURPRISINGLY ADAPTABLE this Jensen Finishing System *coordinates* a Jensen loop-around conveyor and "Dual Heat" oven. Bakes 18" square black enameled water cooler frames and hammerloid finished side panels together, in only 4 minutes!

A *COORDINATED* JENSEN FINISHING SYSTEM AS PART OF YOUR "INLINE" PRODUCTION PROCESS CAN PRODUCE *FINER FINISHES, FASTER, AT LESS COST*

The increasing acceptance and use of infrared radiant heating as a *precision production tool* has put Jensen *Coordinated* Finishing Systems with their many advantages right into the production line, supplementing or taking the place of present heating equipment.

Jensen "Dual Heat" Ovens have always incorporated the *time-saving benefits* of instant heat through radiant energy and the *extra-use value* of convected, derived heated air for greater thermal efficiency. A Jensen Finishing System can be designed to coordinate spraying, baking and drying with a Jensen conveyor of the right type and adaptability, to meet the needs and speeds of your specific finishing operations.

ABSOLUTELY WITHOUT COST OR ANY OBLIGATION TO YOU

Let us conduct laboratory tests on *your* products, using *your* finishes. Parts will be promptly returned for your inspection, together with recommendations to meet *your* production requirements. *You get* practical proof of every possible cost saving.

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MANUFACTURERS OF *ECONOMY-ENGINEERED* RADIANT HEAT EQUIPMENT

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sheets from the hot swill; and to avoid this, softened water should be used.

Spent solutions (especially from chromic acid baths) must not be drained to sewage until they have been neutralized.

This process must not be used for spot-welded or riveted assemblies because of the difficulty of removing or neutralizing acid that may be trapped at welds or beneath rivet heads.

The phosphoric acid process involves pickling solutions containing additions such as alcohol or other wetting agents. For example:

Orthophosphoric acid	10 per cent by volume
Wetting agent	0.5 per cent
Water	remainder

This composition may be applied by swabbing, dipping, or spraying the surface. Proprietary wetting agents are available, but careful choice is important since some agents tend to separate out and produce an oily film on the top of the bath after the solution has been in use for several months. Wetting agents of the alkyl sulfonate type have been recommended for use with phosphoric acid pickles for aluminum alloys.

A phosphoric acid pickle widely used in America has the following composition:

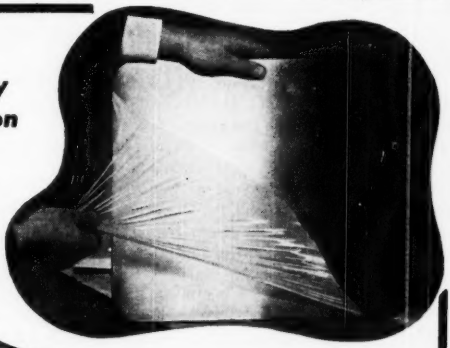
Butyl alcohol	4 gal.
Isopropyl alcohol	3 gal.
Orthophosphoric acid (85 per cent)	1 gal.
Water	2 gal.

This solution is left on the surface for two minutes, and the article is then scrubbed lightly with a brush and thoroughly rinsed in water. A mild steel tank is used.

The A.C.P. Deoxidine No. 202 process (manufactured by Imperial Chemical Industries Ltd. under license from the American Chemical Paint Co., Ambler, Pa.) is suitable for sheets and assemblies. The Deoxidine process

NEW

STRIPLASTIC now available for spray booth coat protection



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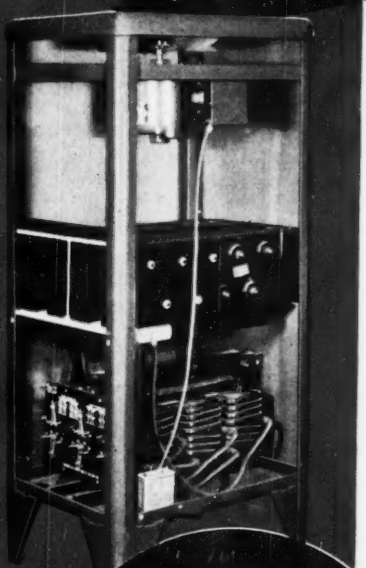

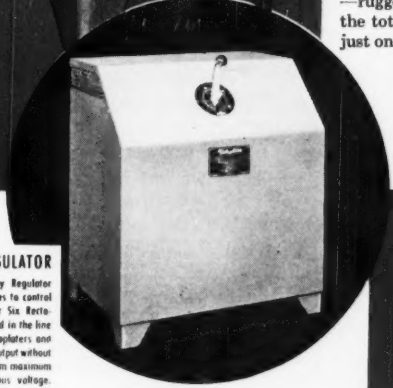

UDYLITE REGULATOR

The Udylite-Mallory Regulator is built in four sizes to control One, Two, Four or Six Rectoplaters. It is placed in the line ahead of the Rectoplaters and will vary voltage output without loss in 24 steps from maximum to 20% of DC bus voltage.

THE UDYLITE-MALLORY RECTOPLATER

JUST TEN YEARS AGO, Udylite pioneered the first standardized rectifier, a self-contained unit that could be set up singly or in multiple to meet varied amperage requirements. This—the first standardized rectifier ever made—was a major step toward more economical and versatile plating shop equipment. For the first time a standardized unit was available which could be used as a single unit or could be installed in a series of units to handle practically all plating jobs. Up till then shop rectifiers were expensive custom-built models which could be used for only one type of operation.

Ten years later with over 7,000 sold, these standardized Udylite-Mallory Rectoplaters are still in production. They have been soundly engineered, so efficiently designed that it has been necessary to make only minor modifications during the entire decade of production. Every Udylite-Mallory Rectoplater built has embodied the high standards of Udylite-made equipment . . . And vital parts of each unit—transformer and bridges—are completely interchangeable.

Add up this outstanding record of dependability—efficient, modern design—easy interchangeability of parts—rugged Udylite construction—and you'll find that the total means real plating shop performance. This is just one of the many developments in the plating industry which Udylite has pioneered. Your nationwide Udylite Technical Team will gladly show you many ways where Udylite can assist you in solving your plating problems. Write The Udylite Corporation, Detroit 11, Michigan. Offices in principal cities.

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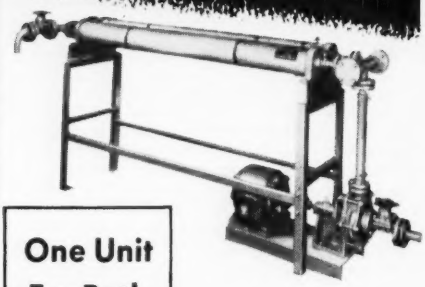
MOTOR GENERATOR SETS ★ SWITCHES ★ RECTOPLATERS ★ RHEOSTATS ★ PLATING SUPPLIES ★ FULL AND SEMI-AUTOMATIC PLATING EQUIPMENT ★ TANKS & TANK LININGS ★ PLATING BARRELS ★ AUTOMATIC POLISHING AND BUFFING MACHINES

Simplify
HEATING and COOLING of Plating Solutions



One Unit For Both

That's one big advantage of INDUSTRIAL'S Unit Heat Exchangers—you use the same unit for both heating and cooling. Maintaining the desired working temperature, by alternate heating and cooling in the one unit, simplifies controls and operation. The units are adaptable to either manual or automatic control.

INDUSTRIAL'S Unit Heat Exchangers are available complete with pump and stand, or tubes alone can be had for wall or ceiling mounting. A wide choice of capacity, too, is possible by using from one to six tubes in a unit. Special units are readily engineered to meet unusual capacity or space requirements.

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can be applied to structures which cannot be immersed in a bath and in circumstances where an immersion plant is not available.

The solution is a fairly heavily bodied, light gray liquid supplied ready for use. It can be applied by brush or spray (using a stainless steel nozzle) in the same manner as paint. For spraying it may be necessary to thin the solution with up to 10 per cent methylated spirit.

The solution should be left on the surface for 10 to 20 minutes, during which it normally dries in the form of a loosely adherent powder; but even if drying conditions are bad and the deposit remains more or less wet, it need not be left longer. The deposit should be sponged off with clean water, or removed by means of grade 0 steel wool. Powder residue in crevices and around rivets must be removed.

Application of Priming Coats

Paint systems for aluminum do not differ from those for other metals and may involve one coat or more. A priming paint for use on aluminum, as on any other metal surface, must conform with the following requirements:

1. For use under severe corrosion conditions, the primer should contain an inhibitor; the inhibitor should not contain red lead.

2. There must be good adhesion between the primer and the surface to be painted.

3. The primer should form a good base for the finishing coats of paint.

4. When stoving undercoats for enamel, the temperature of stoving must be below that which will affect the mechanical properties of the alloy or increase the susceptibility of certain alloys to inter-crystalline corrosion. The maximum permissible stoving temperature will depend upon the alloy and may be between 257 and 338 deg. F. It is important to know the limiting temperature for the alloy before stoving.

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The great race for expansion is over—
Emphasis is now on Improved Products
and Processes.
If your concern is a better product
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COMPLETE NEW FINISHING SYSTEM,
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finishing
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PETERS-DALTON Inc.
HYDRO-WHIRL

Zinc chromate is perhaps the most satisfactory priming pigment for inhibiting corrosion. Barium chromate, calcium chromate, lithopone (co-precipitated zinc sulfide and barium sulfate), and zinc oxide are also effective. Bituminous paints are used, as on other metals, especially on structures in contact with concrete and on road vehicle chasses, for example, to withstand the effects of water and acid. This material is unsuitable under any other type of paint as it "bleeds" and thus discolors.

The qualities of the paint vehicles used in the primer are very important because they largely determine the adhesion properties of the paint and its resistance to moisture.

Although the coefficient of expansion of aluminum is about twice that of steel, all normal paint vehicles are flexible enough to take up any stresses imposed by aluminum.

Application of Finishing Coats

Any normal finishing paint or enamel may be used that is compatible with the primer and adheres well to it. These include oil-base paints, varnishes, enamels, synthetic resin finishes and finishes with a nitrocellulose base—each has its particular application. Where a coating with special properties is required, the paint manufacturers should be consulted.

Paints containing salts of copper or mercury or metallic bronze powders are harmful to aluminum and should not be used; graphite is also harmful. Lead-base pigments are not advised for use in marine applications.

Aluminum paint has proved satisfactory as a protection against exposure to sunlight and rain and to variations in temperature. Its reflective properties make it suitable as a finish for storage tanks containing liquid fuels and other more or less volatile substances where heat-absorption must be small.

Aluminum paint differs from most others in that the particles of pigment are not granular but are extremely thin flakes. These flakes float to the surface of the applied coating, forming a series of metallic layers separated by thin layers of vehicle; the top layer forms an apparently continuous film of aluminum. This phenomenon is known as "leafing" because the flakes in the film are arranged in a manner resembling fallen leaves.

Aluminum paste, made from blown or granulated aluminum powder which has been ball-milled to a flaked form, has the advantage of freedom from dust when mixing, freedom from risk of explosion, and greater consistency. The continuity of the coating provided by this flaked aluminum increases the durability of the paint vehicles in which it is incorporated.

The vehicle chosen for aluminum paint should be one giving a very flexible or elastic paint film. Aluminum

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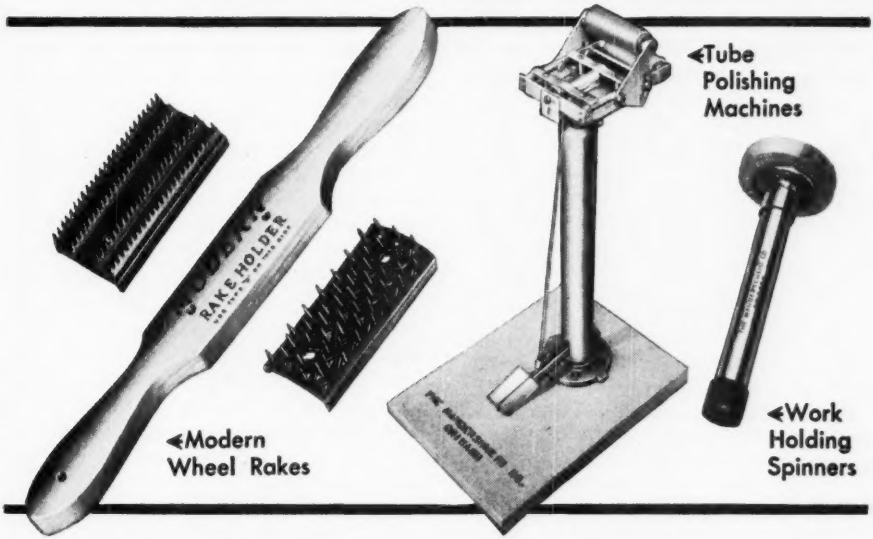
Metal Finishing Supplies

RAKES . . . SPINNERS . . . TUBE POLISHING MACHINES



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You'll find this modern wheel rake safe, fast and economical. It will recondition and shape polishing wheels and buffs with a minimum loss of material and without hazard. Write for complete details and prices.

Tube Polishing Machines Improve Workmanship

Rubber rolls tapered against each other drive tubing across face of polishing wheel or abrasive belt. Tube machine produces a uniform finish, free from spiraling. It polishes tubes from ¾" to 5" in diameter.

Work Holding Spinners For Uniform High Speed Polishing and Buffing

Here's a spinner for holding work and producing uniform high speed polishing and buffing. It has totally enclosed grease packed ball bearing construction. Removable fixture flange has machined face and screw holes for attaching wood block or other fixtures. Write for complete literature and price quotation.

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• METAL FINISHING SUPPLIES AND EQUIPMENT •

paint made with a shorter-oil, harder-drying varnish is generally too brittle to adhere well.

A coat of clear lacquer is often applied to aluminum over certain mechanical and chemical finishes in order to preserve surface brightness. The lacquers used may be solutions of semi-hard or soft resins in volatile solvents such as alcohol, or plasticized solutions of synthetic resins such as cellulose nitrate and cellulose acetate. Plasticized films of synthetic resins show high elasticity, adhere well, and have a glossy appearance. Colored lacquers are also applied for decorative purposes.

Stoving finishes are successfully applied to aluminum and aluminum alloy surfaces by the common methods and within the temperature limits applicable to the material. Pre-treatment of the metal is essential. The paints used incorporate natural and synthetic resins in varying combinations giving different properties. Thus melamine and alkyd resins are good and durable and give an appearance closely resembling that of vitreous enameling; phenolic resins produce very hard paints but in the pastel shades the colors tend to darken after a time.

The paint is sprayed on at 70 to 80 lb./sq. in., and the surface is then stoved at a temperature of 190 to 350 deg. F. for periods determined by experiment and up to about one hour. The metal supplier should be consulted as to the maximum temperature to which the aluminum alloy concerned may be subjected.

Finishes such as the crinkle and crystalline effects can also be applied. Crinkle effect is produced by applying a china-wood-oil base material and stoving at 200 to 210 deg. F. for one hour. The crystalline finish is similarly produced by stoving at 180 to 220 deg. F. for the same period in an oven in which a gas jet is burning with a luminous flame.

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PLASCOTE NO. 1

The new peelable plastic boothcoating.

- Actual using reports prove Plascote No. 1 will cut booth cleaning time in half.
- It is applied quickly and easily by use of ordinary paint spray equipment, or by brushing.
- Shipped ready to apply, no pre-mixing necessary.
- Inflammable over-sprayed paints may be peeled from the spray booth walls in large sheets.
- Economical to use due to extensive coverage per gallon.

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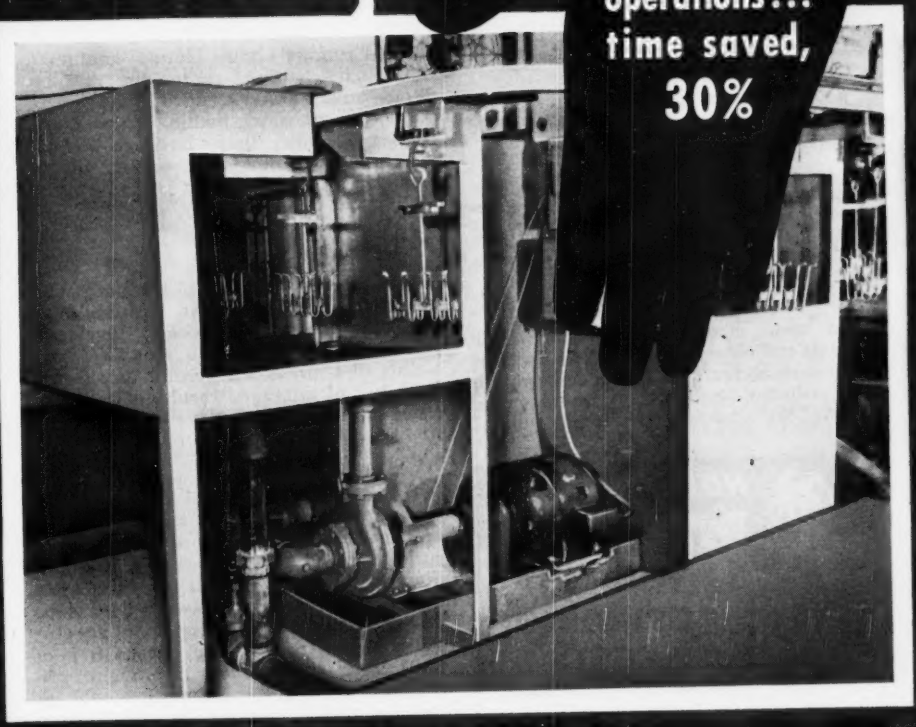
eliminates messy hand operations... time saved, 30%



Cincinnati

Continuous drying or stoving is applicable to aluminum alloy articles as to others by means of radiant-heat furnaces, and both gas and electric furnaces may be used. The component rarely reaches a temperature that will impair the strength imparted to the alloy by cold work or heat-treatment; but where this possibility does exist, it is advisable first to check, by means of a thermocouple, the maximum temperature the component reaches while passing through the furnace.

Acknowledgment

The writer is indebted to The Aluminum Development Association (Great Britain) for special permission to use data from "Information Bulletin No. 13" in this article.

The new silicone resins and their enamels are establishing records for their heat-resistant qualities. Silicones originate from ordinary sand and, in some ways, out-rival the miracles of the other synthetics which the chemists have developed from coal, air and water. They have definitely established themselves in the field of electrical insulation and their use in the protective coatings field is just in its infancy.

The Platinum Group Metals—platinum, palladium, rhodium, ruthenium, and iridium—have earned a place in the chemical, electrical, glass, textile, dental, medical, and jewelry fields because of their unusual properties, long service life in continuous manufacturing processes, and high scrap value.

Through the research of the paint and finishes industry, effective rust-inhibitive protective systems have been developed which add longer life to structural materials and cut down greatly on the annual bill of damages resulting from corrosion.

For the suppression of acid spray in plating and stripping tanks small pellets of Bakelite polyethylene are floated on the surface of the liquid in large enough quantities to completely cover over the open area. These pellets will always float since polyethylene has a very low specific gravity. The pellets also act as a heat insulator in cold weather to prevent radiation losses in the tank which would affect the plating results. The suppression of the spray saves the ventilating system from being replaced frequently as well as prevents the operators from inhaling the fumes. The pellets are so designed that work may be easily removed from the bath, for the pellets realign themselves and cover over the exposed chromic acid of their own accord. In conjunction with sulfuric acid stripping baths, the pellets prevent the dilution of the acid by deliquescence from moisture in the air. Since the plastic material will not absorb water and is unaffected by strong chemicals, the pellets will continue to float through long periods of operation and will not plug up drains. They can be easily skimmed off the surface with a strainer.

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DEBURRING WILL CUT GRINDING COSTS
Motor Driven Tilting Tumbling Barrels for cleaning, polishing, grinding, deburring, sanding, burnishing and various other applications.
Wide selection of metal finishing equipment on hand. Write for FREE folder "M."
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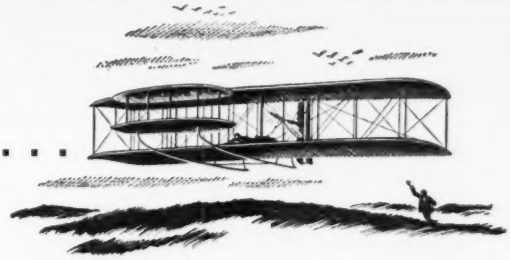

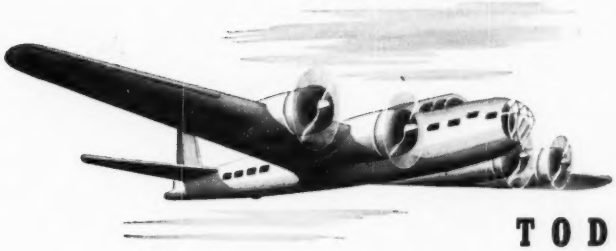

TODAY!

In the early days of flying, speed was limited and not too much attention was paid to the paint finish. However, fast-flying aluminum airplanes of today are subjected to severe exposure conditions, which create two serious problems — making paint stick and protecting the metal.

These problems — common to all products fabricated of aluminum — have been successfully solved by the use of

"Alodine"®

ALODIZING gives aluminum a protective coating which bonds paint and resists corrosion.

The ALODIZING process is simple, rapid, economical. It requires no electrical equipment, no high temperatures, no special skill or technical training. "ALODINE" can be applied in a dip, spray, or brush process.

Products that are Alodized are "extra-value" products. Tell your customers — tell the world — you are ALODIZING. Specify "ALODINE" for the utmost in protective quality.

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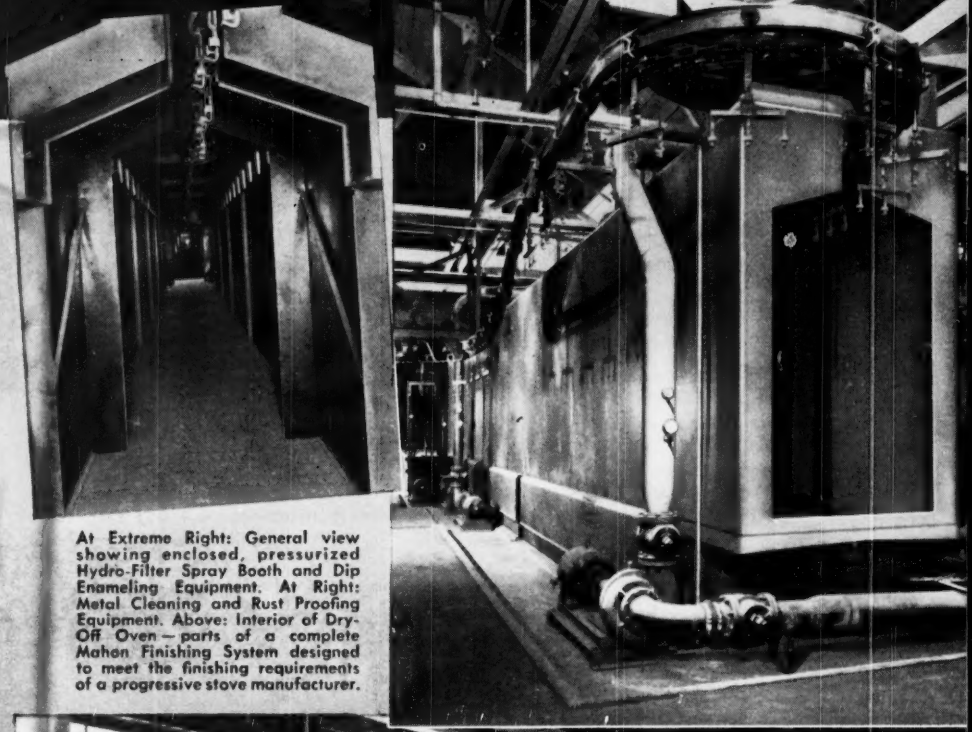

At Extreme Right: General view showing enclosed, pressurized Hydro-Filter Spray Booth and Dip Enameling Equipment. At Right: Metal Cleaning and Rust Proofing Equipment. Above: Interior of Dry-Off Oven — parts of a complete Mahon Finishing System designed to meet the finishing requirements of a progressive stove manufacturer.

Modern Finish Baking Ovens — this Oven [illegible] Mahon Finished parts, while the Oven in the [illegible] Enameled parts. These are part of the [illegible] Finishing Systems.

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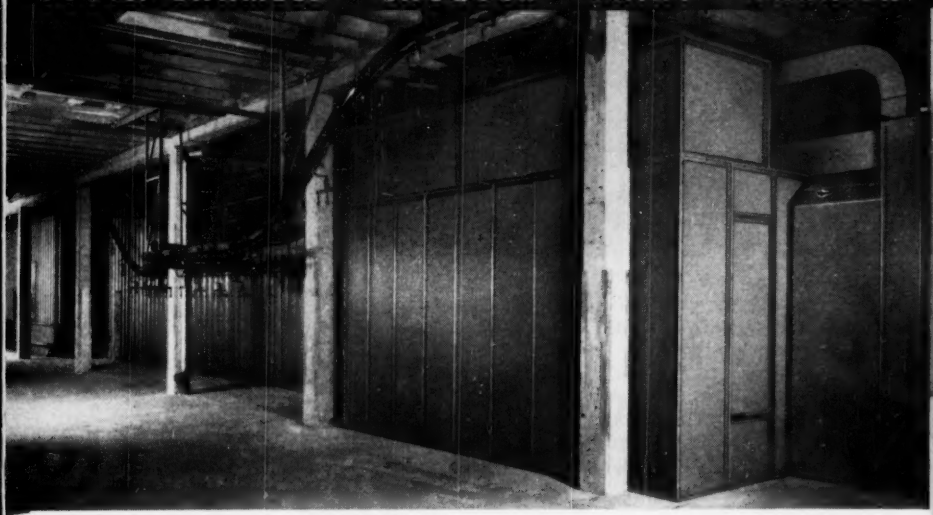

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Spotlighting FINISHING Progress

Heat Treatment of Chromium Plate

By DR. ALLEN G. GRAY

ONE of the highlights of the Electrodeposition Symposium, held as a part of the recent 96th meeting of the Electrochemical Society in Chicago, was a report by Cloyd A. Snavely and Charles L. Faust of Battelle Memorial Institute on the structure of hard chromium plate, which brought out experimental data showing changes that take place in chromium plate as a result of annealing. The research work was carried out under the sponsorship of the Army Ordnance Department and was undertaken to study the phenomena occurring during the annealing of "hard" chromium plate and to provide data for evaluation of existing theories for the hardness of "hard" chromium plate.

According to Snavely and Faust, two general concepts of the hardness of chromium plate have been published. One accounts for it by the fine-grained condition of the plate, with internal stresses being a minor contributing factor. Loss of hardness on heating is considered to result from recrystallization and grain growth. The other concept accounts for hardness by a critical dispersion of chromic oxide particles which are said to exert "keying" action to inhibit slip within crystals in a manner analagous to that postulated for various precipitation hardening alloys. Here, loss of hardness on heating is ascribed to agglomera-

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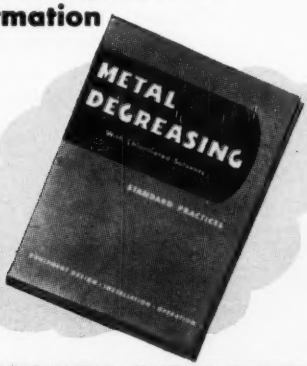

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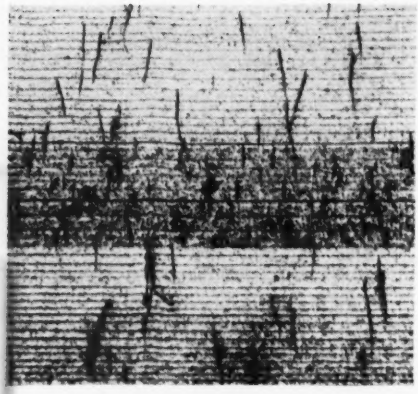

Fig. 1 — Microstructure of a cross-section of typical hard chromium plate in the "as-plated" condition, showing the inclusion filled cracks normally found in hard chromium plate (300X) *(Photo courtesy Battelle Memorial Institute, Columbus, Ohio)*

tion of the dispersed oxide particles with subsequent migration into the grain boundaries.

If softening is a result of recrystallization, then the beginning of major softening effects during annealing should be accompanied by the appearance of recrystallized grains in the metal. However, if softening is a result of agglomeration of oxides, these agglomerates should become sufficiently large after appropriate heat treatment to be visible under a microscope. Using this reasoning as a basis, a series of experiments was carried out in the Battelle Memorial Institute laboratories which involved plating hard chromium on steel cathode disks, annealing each of them at a different temperature, and subjecting all of them to metallographic examination. All of the samples used in the study were plated from a conventional bath containing 33 oz./gal. chromic acid and 0.33 oz./gal. sulfate. The samples were plated on ½-inch-diameter cathode discs of S.A.E. 4130 steel. A current density of 250 amp./sq. ft. and a bath temperature of 131 deg. F. were used. The experimenters considered these conditions to represent standard hard chromium plating practice.

Figure 1 shows the microstructure of a cross-section of typical hard chromium plate in the "as plated" condition. The inclusion-filled cracks, normally found in hard chromium plate, are clearly shown in the photomicrograph. In addition, certain types of striations are shown. It was pointed out by Faust and Snavely, that although examination of this surface at higher magnification did not reveal grain structure, it was possible to partially resolve units elongated normal to the base metal.

Heat Treatment of Plate

Snavely and Faust reported that metallographic examination of chromium plate after heat treatment at 572 deg. F. for 22 hours gave no indication that the heat treatment had produced any significant change from the structure shown in Fig 1. With plate that had been heat treated at 932 deg. F. for 12 hours, recrystallized grains were clearly shown, thus definitely establishing that recrystallization of hard chromium plate begins

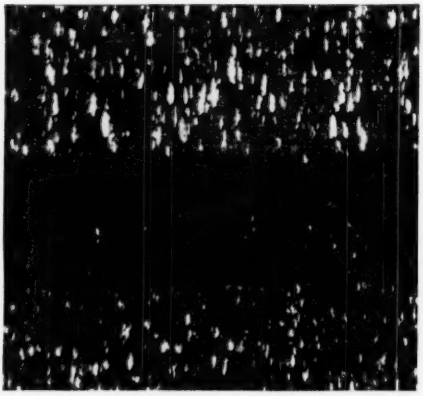

Fig. 2—Hard chromium plate after heat treatment at 932 deg. F. for 12 hours, showing recrystallized grains (300X) *(Photo courtesy Electrochemical Society)*

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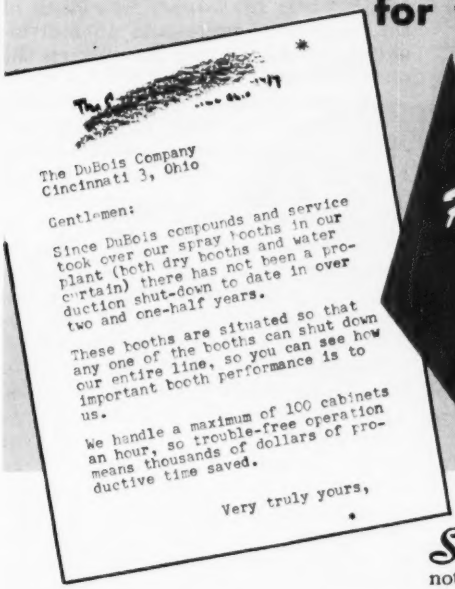

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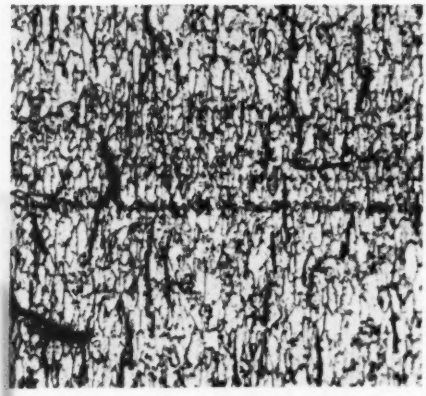

Fig. 3—Photomicrograph showing hard chromium plate after heat treatment at 1292 deg. F. in Battelle Institute Laboratories. Complete recrystallization is evident (300X). *(Photo courtesy Electrochemical Society)*

between 572 deg. F. and 932 deg. F.

Experiments were carried out wherein the annealing temperature was increased to 1292 deg. F. and 1652 deg. F., respectively, for 12 hours. It was reported that complete recrystallization of the plate occurred during the annealing treatment at 1292 deg. F., and essentially no structural changes were effected by increasing the annealing temperature to 1652 deg. F. However, interdiffusion during the latter treatment produced an alloy layer between the steel base metal and the chromium plate. Figure 2 shows hard chromium plate after treatment at 932 deg. F. for 12 hours; the recrystallized grains are clearly revealed. The photomicrograph in Fig. 3 shows hard chromium plate after treatment at 1292 deg. F., showing complete recrystallization. Figure 4 shows a cross-sectional view of an unannealed chromium plate photographed with polarized light. The columnar mode of growth of the plate is strikingly illustrated. It was pointed out by Faust and Snavely that apparently each of the "columns" represents an individual nodule or "dome" growing on the plate surface.

All indications are that air oxidation of chromium, at both moderate and elevated temperatures, is slow because of the density of the oxide film that is formed. However, at temperatures in the region of 1652 deg. F., or above, a nitrate of chromium is readily formed, regardless of the surface film of oxide. The nitrogen atom appears to penetrate the oxide film to reach the underlying chromium metal.

Modern theory for the mechanism of oxidation holds that, in some cases, metal atoms must diffuse through covering oxide films to the air-oxide interface if additional oxide is to be formed. The large size of the oxygen atom is considered to prevent its penetration into the oxide to reach the underlying metal. Following the same reasoning, the small size of the nitrogen atom may explain the ease with

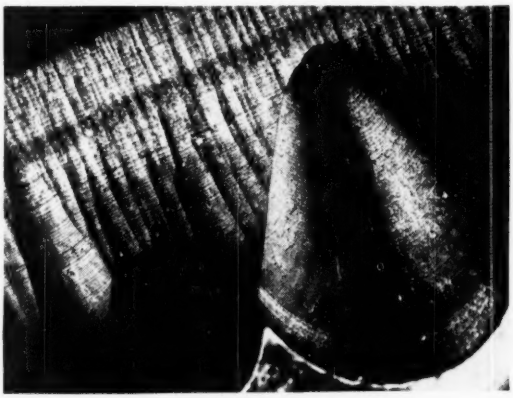

Fig. 4—Cross-section view of an unannealed chromium plate photographed in Battelle Institute Laboratories with polarized light. The columnar mode of growth of the plate is strikingly illustrated (300X). *(Photo courtesy Electrochemical Society)*

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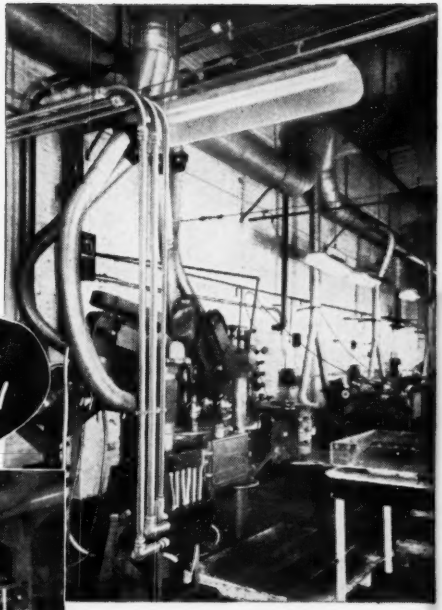

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Table I

Tests conducted at Battelle Memorial Institute Laboratories and described before the 96th Meeting of The Electrochemical Society, showing effect of plate thickness and of base metal surface on the crystal orientation of bright chromium plate

Sample No.	Basis-Metal Surface	Plating Time (Min.)	X-ray Results	
			Pattern Identified and Intensity	Crystal Orientation(3)
1	Machine-ground steel (2)	5	Chromium—medium	Random
2	Ditto	10	Chromium—medium	Random
3	Brass	5	Chromium—weak, brass—weak	Chromium—random + brass—oriented
4	Ditto	10	Ditto	Chromium—weakly oriented + brass oriented
5	Ditto	15	Chromium—weak	Oriented
6	Ditto	20	Chromium—very weak	Oriented
7	Machine-ground steel	15	Chromium—weak + steel?	Random
8	Ditto	20	Chromium—weak	Random
9	Electropolished steel	5	Chromium—strong + steel?	Random
10	Ditto	10	Chromium—weak	Weakly oriented
11	Ditto	15	Ditto	Ditto
12	Ditto	20	Chromium—very very weak	Weakly oriented

(1) All plating done in 250 g./l. CrO_3 bath with $\frac{100}{1}$ acid ratio, at 130° F., and with a current density of 300 amp./sq. ft.

(2) SAE-4130 steel was used.

(3) By means of electron diffraction tests, the preferred orientation was identified as (111) plane parallel to the base metal surface.

which it penetrates the oxide film to form chromium nitride. The experimental evidence presented indicates that chromium will form nitrides, if the temperature is sufficiently high, even though the concentration of nitrogen is very low. A similar situation is known to exist between chromium and oxygen at lower temperatures, though, in that case, the initial reaction is a protective film. Data on hardness of annealed plate showed that temperatures of the order of 1832 deg. F. or over are necessary to obtain complete or "dead" annealing in 12 hours or less.

Effect of Base Metal On Chromium Plate

During the course of this study, a series of experiments was carried out to determine what effect the base metal surface might have on the structural makeup of chromium plated on it. Reference to the literature will bring out the fact that numerous investigators have shown that chromium plate is normally oriented with the (111) plane parallel to the base metal. Whether this orientation is assumed at the very beginning of plating or at some time during buildup of a plate has never been established.

X-ray and electron diffraction studies were carried out to identify orientation, or lack of it, in chromium plated on cold-rolled brass, electropolished steel, and machine-ground steel. The results, given in Table I, indicate that the cubic crystals comprising chromium plate are distributed in random positions in thin plates. In

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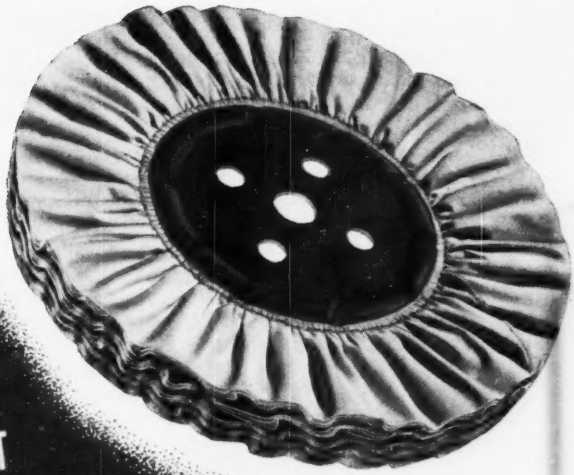

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thick plates, the crystals are arranged, or oriented, with the (111) plane parallel to the plate surface. As plating proceeds, the random arrangement changes to the regular "parallel to surface" arrangement. As shown, plates on cold-rolled brass and on electropolished steel achieve the "parallel to surface" arrangement much more quickly than do those on machine-ground steel.

From these data, the deduction is that the surface of ground steel is so rough and broken that deposition must continue for considerable time to achieve the (111) preferred orientation, normal for chromium plate. The brass surface consists of at least partially oriented crystals, so a relatively short plating time of 10 minutes produced an oriented plate. Electropolished steel, similar to brass, allowed the chromium plate to achieve the preferred orientation after 10 minutes of plating.

A further indication from the Battelle experiments is that all chromium plates are likely to be oriented if plating is continued to build up thick deposits. The preferred orientation is quickly achieved if the base metal surface is smooth and regular. If the base metal is irregular, as a result of grinding or machining operations, plate thicknesses over 0.0005 inch must be reached before any considerable degree of preferred orientation is attained.

Hydrogen in Chromium Plate

Figure 5 shows the volume of hydrogen given off at various temperatures by chromium plate produced from a standard 33 oz./gal. chromic acid bath. The chromium used for test was plated on brass disc cathodes which were subsequently dissolved in dilute nitric acid, leaving the chromium plate unattacked. It was pointed out that the evolved gas was captured, measured, and analyzed to make certain it was essentially pure hydrogen. The above figure shows the amounts evolved at the various temperatures, in view of the fact that treatment at each of the temperatures shown was continued until gas evolution slowed

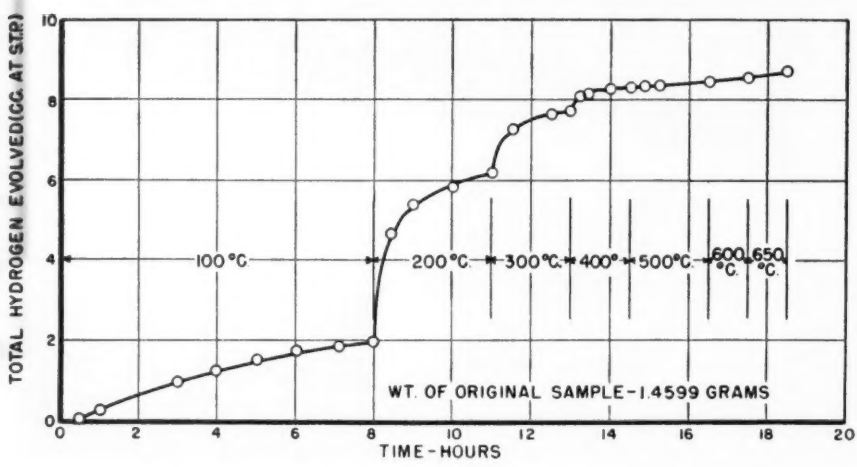

Fig. 5—The volume of hydrogen given off by chromium plate subjected to temperature-time increments under vacuum, based on Battelle Institute tests.
(*Illustration courtesy Battelle Memorial Institute*)

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Table II

Effect of Vacuum Heat Treatment on Hardness and Crystal Orientation(1) in Bright Chromium Plate(2)

Sample No.	Vacuum Heating Temp. (°C.)	Time(3) At Temp. (Min.)	Average Hardness(4) (Knoop)	Number of Hardness Measurements
13	100	60	961	4
15	200	60	864	4
16	300	60	803	5
17	400	30	856	4
18	500	30	816	4
19	600	30	486	1
20	650	30	524	2

(1) Electron diffraction tests showed that all of the above plates were oriented with the (111) plane parallel to the basis.

(2) All plates on brass, 250 g./l. CrO_3 and $\frac{100}{1}$ acid ratio solution, 130° F., 300 amp./sq. ft., plating time—3½ hrs.

(3) Time at temperature is cumulative. Each specimen received all treatments listed above it.

(4) 500-g. load, 200X magnification for reading impression.

down considerably. One point brought out by Snavely and Faust was that chromium deposited from a trivalent bath developed by work at the Bureau of Mines was essentially no different from the plate produced from the commercially used chromic acid bath.

Effect of Vacuum Heat Treatment on Hardness

The Battelle research also included X-ray, electron diffraction, and hardness examination of chromium plated samples subjected to vacuum-temperature treatments. Table II gives the effect of various treatment conditions on the hardness of the chromium plate. It was pointed out that there is the possibility that two separate effects may be taking place as the temperature of treatment is increased. First, at temperatures up to 572 deg. F., stress relief is thought to explain the softening. The increased movement of the atoms necessary for stress relief is thought to explain the softening. The increased movement of the atoms necessary for stress relief probably also accounts for the escape of hydrogen from the plate.

It should not be assumed from these tests that serious softening of chromium plate will not occur below 932 deg. F. The data given applies only to the heating periods used in these tests, and longer periods would undoubtedly produce softening at lower temperatures.

* * *

Amorphous Phosphate Coating for Aluminum Alloys

THE Fourth Educational Session of the 1949 Convention of the American Electroplaters' Society featured a symposium on treatments for light metals. As a part of this session, Alfred Douty and F. P. Spruance, Jr., American Chemical Paint Company, presented data on a new type of amorphous phosphate coating for aluminum surfaces which possesses corrosion resistance when used alone and

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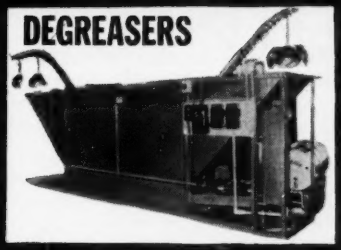

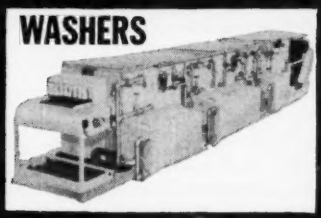

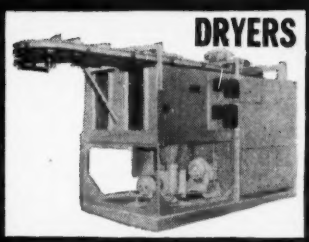

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also serves as a valuable base for organic coatings. The protection provided by organic coatings on aluminum, in general, is limited by two factors, namely, (1) corrosion beneath the paint film, and (2) lack of adhesion of the paint film to the metal. The use of adherent inorganic protective coatings on aluminum has long been recognized as efficacious in reducing corrosion rate and prolonging paint life.

The process used to produce the new amorphous phosphate coating, known as the "Alodine" coating, uses a solution consisting essentially of a mixture of chromic, phosphoric, and hydrofluoric acids in certain well defined proportions. A chart appearing in U. S. Patent 2,438,877 gives the operative ranges of the solution in terms of phosphoric acid concentration and ratio of fluorine to chromic oxide for solutions prepared with an alkali fluoride. However, it was pointed out by Douty and Spruance that considerable latitude is allowable in the concentration of all components of the solution without adversely affecting its coating properties.

The process as used in production line operations consists of the following steps:

1. Remove surface contaminants by essentially conventional means.
2. Rinse free of any adhering alkali.
3. Treat for a short time in the amorphous phosphate coating (Alodine) solution.
   Two variations in procedure are applied here, depending on whether the treated panel is to be used without a subsequent coating or if it is to be painted.
4. For maximum corrosion resistance, the treated panel is dried at elevated temperature without rinsing. If it is not planned to paint the metal, the process may be considered complete at this point.
   For panels to be painted, the work from 3 or 4, above, is rinsed with clean water.
5. The work is given a final rinse in dilute chromic or phosphoric acids, or a mixture of both.
6. The work is dried.

Temperatures used in the coating process range from 100 to 130 deg. F. The pH of the bath is maintained between 1.6 and 2.2 and may be determined colorimetrically by means of appropriate indicators. The coating may be applied to the metal by immersion, spraying, or brushing. The spray process is more rapid than the immersion process as is indicated by the curves in Fig. 6, which shows the time required to develop the optimum coating, assumed to be 200 mg./sq. ft., at various temperatures for the spray and immersion processes.

It was pointed out by Douty and Spruance that cleaning procedures prior to application of the amorphous phosphate chemical coating may be of

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conventional character; however, they should be followed by thorough rinsing, preferably by a slightly acidulated rinse. Traces of adhering alkali, as from cleaning operations, are deleterious in that they cause the formation of a loose and powdery coating on the surface, Also, final rinsing of the phosphate treated surface in a dilute solution of chromic or phosphoric acid, or both, is of benefit in inhibiting the blistering of applied paint films in humid atmospheres.

The coating produced by the new process, according to Douty and Spruance, is essentially an amorphous metallic phosphate coating. It is dense, quite hard, and apparently non-porous. Unlike oxide films on aluminum, it is unabsorptive and cannot be dyed. It was pointed out that microscopic examination, as well as both X-ray and electron diffraction studies, has failed to show any crystalline structure or definite diffraction pattern. When dried at low temperature, the main constituents of the coating were said to be: chromium phosphate, 50 to 55 per cent; aluminum phosphate, 17 to 23 per cent; water, 22 to 33 per cent.

It was emphasized by Douty and Spruance that the original purpose in development of this new process was to increase the adhesion of paint to aluminum and to lengthen the overall life of painted aluminum articles. It was only later that its unpainted corrosion resistance was realized and development work began to improve this characteristic. Its primary use today is still as a paint bonding and underpaint corrosion inhibiting coating. Figure 7 illustrates the effectiveness of the coating produced on unpainted 3S grade aluminum. The panels shown in this figure were given various chemical treatments; all were removed from the salt spray cabinet after 300 hours, except the amorphous phosphate treated (Alodized) and anodized

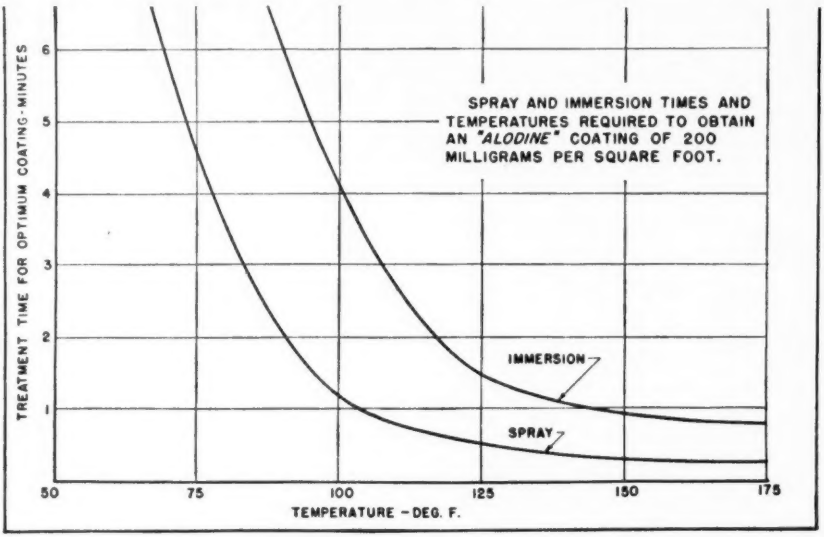
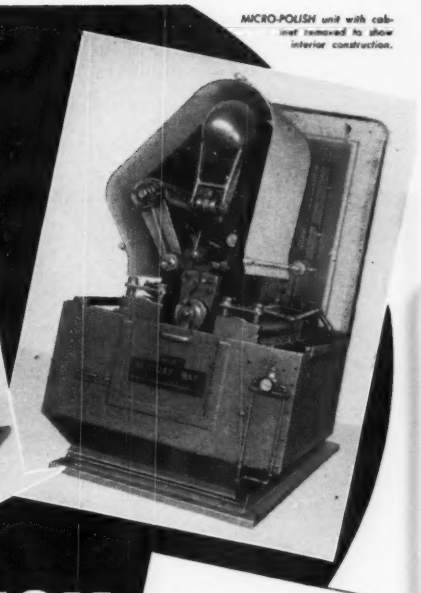


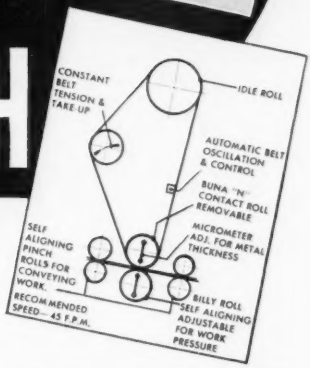
Fig. 6—Curves presented before the 1949 Electroplaters' Society Convention by American Chemical Paint Company, showing spray and immersion times required to obtain an amorphous type phosphate ("Alodine") coating of 200 milligrams per square foot
(Illustration courtesy American Chemical Paint Company)

MICRO-POLISH unit showing accessible controls and neat compact designs.



MICRO-POLISH unit with cabinet removed to show interior construction.

MICRO-POLISH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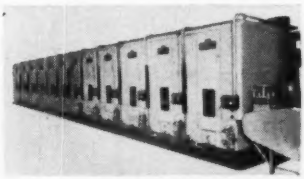

A typical 12 unit MICRO-POLISH installation.

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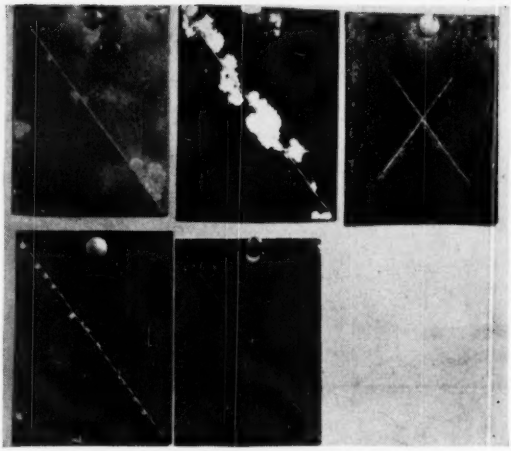

Fig. 8—Effect of amorphous phosphate coating in retarding under-paint corrosion is illustrated by above corrosion tests described before the 36th Annual Electroplaters' Society Convention. According to tests conducted in American Chemical Paint Company Laboratories after 3000 hours' salt spray, the phosphate treated surface (lower right-hand corner) was in perfect shape and the anodically treated panel (next to it) had begun to fail. *(Illustration courtesy American Chemical Paint Company)*

panels (lower two right panels), which were removed after 800 hours.

The effect of the amorphous phosphate coating in retarding under-paint corrosion is shown in Fig. 8, based on tests conducted in the American Chemical Paint Company laboratories. It was pointed out by Douty and Spruance that all of the panels in this series, with the exception of the amorphous phosphate coated (Alodized) panel (No. 7 in lower right corner), were primed after various surface treatments with a regular automotive primer. After baking, the panels were successively given a surfacer coat, which was dry-scuffed with sandpaper as per standard automotive practice, followed by a regular black baked top coat. The panel No. 7 (lower right corner) was given the top coat only, directly on the amorphorous phosphate (Alodized) treated metal. Some fail-

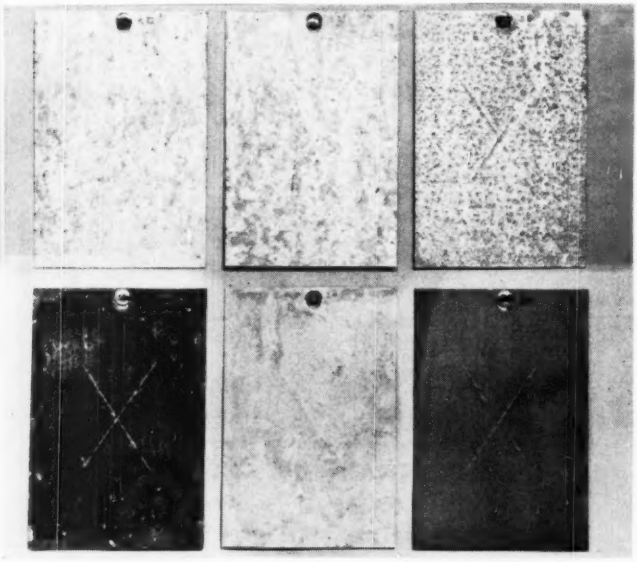

Fig. 7—Panels tested in American Chemical Paint Company Laboratories, showing effectiveness of the amorphous phosphate coating ("Alodine") on unpainted 3S aluminum. The panels were given various chemical treatments; all were removed from the salt spray cabinet after 300 hours, except the anodized and phosphate treated panels (lower two right-hand panels) which were removed after 800 hours. *(Illustration courtesy American Chemical Paint Company)*

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ure was noted in other coatings at 300-400 hours of salt spray.

One important property of the amorphous phosphate type coating that may be of value in certain finish-

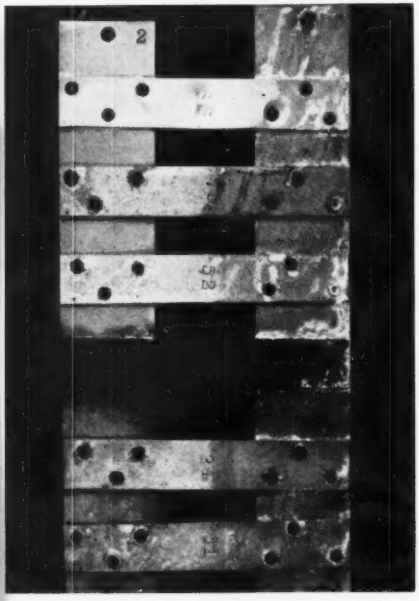

Fig. 9—The strip on left is 2S aluminum which has been treated to produce the amorphous phosphate ("Alodine") chemical coating, while that on right is uncoated. Strapped between the strips are different metals. Corrosion tests show effectiveness of chemical coating in retarding galvanic corrosion. (Based on data presented at 36th Annual A.E.S. Convention). *(Illustration courtesy American Chemical Paint Company)*

ing applications is its resistance against bi-metallic or galvanic corrosion. This behavior appears to be due to the fact that the coating has a very high surface resistance. This is illustrated in Fig. 9. The strip on the left is 2S aluminum which has been treated to produce the amorphous phosphate type coating, while that on the right is uncoated. Strapped between the strips are different metals attached with hollow brass rivets. According to Douty and Spruance, the assembled test rack was exposed for a total of 21 months on the roof in a semi-industrial area close to a railroad. In addition, in order to accelerate the effect, the specimens were exposed to 150 hours salt spray. The cross-pieces are as follows, reading from top down: SS-stainless steel, type 304; 75-75ST aluminum; 52-52S aluminum; S-1010 cold rolled steel; 24-24ST aluminum; 61-61ST aluminum. This test is evidence that the amorphous phosphate treated strip offers considerable protection against galvanic corrosion.

* * *

Electropolishing Brass On a Production Line Basis

THE application of a recently developed bath for electropolishing brass luggage parts on a production line setup at Samsonite Luggage Division, Shwayder Bros., Denver, has recently been described by W. G. Axtell, chief engineer of the luggage company. (See also "The Iron Age," June 30, 1949.) The parts are electropolished by rotating a rack, loaded with from 60 to 100 parts, in the polishing solution. Figure 10 shows a diagram of the setup used in the electropolishing process.

An important feature of the process is that the cells which contain the polishing electrolyte are so constructed that the article cannot accidentally come in contact with the cathode. To accomplish this, a ceramic jar is placed within a steel tank, which is made the cathode, the ceramic jar being of a size such that a space about one inch wide is provided between the jar and the tank. In the space so formed, cooling coils are placed, since cooling is generally required to maintain the bath at about 98 deg. Fahrenheit.

The basic bath has the composition given below:

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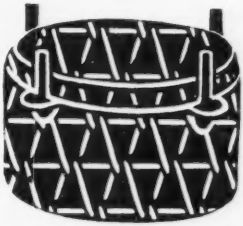

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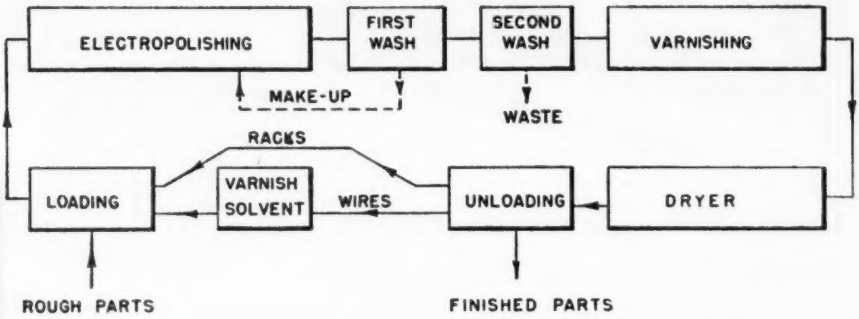

Fig. 10—Diagram of commercial setup used in electropolishing brass parts
(Illustration courtesy "The Iron Age")

Glycerol	24.9 per cent
Orthophosphoric acid (85 per cent)	41.5 per cent
Ethylene glycol	16.6 per cent
Lactic acid (85 per cent)	8.3 per cent
Water	8.7 per cent

However, other agents may be added to the bath to increase the brightness of the polished surface and to improve the ability of the solution to polish sharply curved surfaces or surfaces remote from the cathode. Some of the compounds described as satisfactory for this use include mannitol, amino acids such as glycine and glutamic acid, and amines such as ethylene diamine and monoethanol and triethanol amines. Glutamic acid and monosodium glutamate were stated to produce unusual results in increasing brightness of the polished surfaces when used in small quantities.

The basic principles of a method devised by Dr. H. F. Walton, University of Colorado, are used for evaluating the reflecting power of the production line polished brass parts. It provides a test of sharpness of definition or resolving power, rather than actual brightness or amount of light reflection. According to Dr. Walton's method, a number of lines are ruled on a white card, 0.5 mm. thick and 2 mm. apart (center to center). The rulings are along one edge of the card and at right angles to it. The polished plate to be examined is placed horizontally on the table, and a ruler held vertically in contact with it. The card is then held horizontally, with the rulings downward, against the ruler, and moved up and down while the reflection of the rulings in the polished surface (brass) are observed. It will be found that as the card is raised, a point is reached at which the image of the lines is no longer distinct and the lines merge into one another. (Description based on private communication from Dr. Walton.)

In applying Dr. Walton's test to the examination of electropolished parts, the operator sits at the desk with one sample laid before him and holds the card with the lines on its underside, looking at the reflection of the lines in the surface of the sample. The card is

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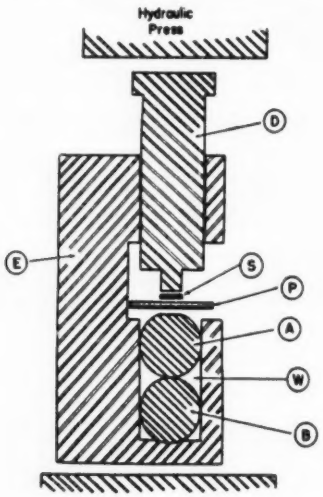
then raised until the six lines can no longer be distinguished in the reflection but merge into a single blur. The operator reads the height of the strip above the surface on a centimeter rule



A — ¾-inch steel ball with ¼-inch flat ground on.
B — Free-turning ¾-inch steel ball.
D — Plunger.
E — Supporting frame.
P — Photographic film or plate, emulsion up.
S — Specimen under study, prepared face down.
W — Grease-filled well.

Fig. 11—Equipment for impressing surface replicas into photographic emulsions. The method will reproduce the detailed structure of many kinds of metal surfaces.
(Illustration courtesy "Metal Progress")

held vertically. It is reported that the method for surface reflectivity evalution is accurate to ½ cm. and is reproducible.

* * *

Surface Reproduction With Three-Dimensional Effect

MANY finishing technologists have occasion to consider methods for surface reproduction. Of interest in this connection is a recent report by K. B. Mather, based on work carried out at Washington University, St. Louis, which has shown that if a reasonably flat metal surface is pressed into a fine-grained photographic emulsion at about 15,000 p.s.i., and the plate developed, a pattern will be observed on microscopic examination that reproduces the surface contours. The method is said to reproduce the detailed structure of any kind of surface, whether machined, lapped, or polished. Also of interest is the pronounced three-dimensional appearance of the surface reproduction. This effect was described as being made evident by gradations in density across the negative. (See also "Metal Progress," August, 1949.)

The method, which resulted from research projects being sponsored at the university by grants from the Office of Naval Research, uses equipment as it sketched in Fig. 11. The specimen surface is prepared in the form of a thin disc of the same diameter as the flat face of ball **A** (¼ inch). The photographic plate **P** is placed emulsion side up between the prepared surface of specimen **S** and the flat surface of ball **A.** The mechanical arrangement is designed to ensure proper seating of the specimen's surface on the emulsion. Ball **A** rotates fairly freely in the grease packed well **W,** allowing it to square the specimen against the emulsion. A hydraulic press is applied to plunger **D,** the pressure applied to a specimen being indicated by a gage.

The type of photographic emulsion to be used in this application is of importance. For pressure work of this kind it is necessary to use unprotected emulsions. The Ilford "Nuclear Research Plates B2, C2, E1, and D1" and Eastman "Nuclear Track Plates A, B, and C" appear to be sufficiently sensitive to pressure for this application.

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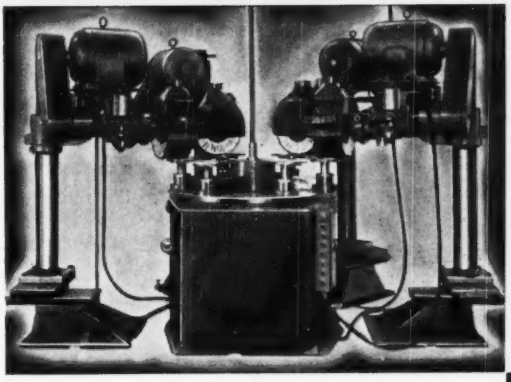

Polishing and Buffing Machines

ONE SECOND INDEXING TIME BETWEEN STATIONS

40-Inch ACME Indexing Type Rotary

This photo shows a 40 inch ACME Rotary of the indexing type. It has individual variable speed drive for table indexing with a normal range of up to 1200 indexes per hour. It is equipped with individual drive for work spindle speed and is shown with four ACME Adjustable Floating head polishing and buffing lathes.

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surface replicas is its fidelity in reproducing the third dimension of a contour. A gelatin emulsion, even in the dry state, is sufficiently plastic that, under pressure, it assumes the shape of the surface on which it is pressed. In particular, the greater the pressure at any point the greater the density at that point after development. Thus, high spots on a specimen surface cause greater than average density while indentions cause lesser density. The three dimensional nature of the specimen surface is thereby made evident by gradations in density across the negative. The result is a high contrast, transparent replica of the specimen surface. In most work pressures of about 15,000 p.s.i. are generally applied for about one minute. After compression, the photographic plates are developed, fixed, washed, and dried in the conventional manner.

* * *

An Improved Anode for Alkaline Tin Plating

PLATERS concerned with extending the permissible anode current density in the potassium stannate type plating bath for tin will be interested in the report before the 96th meeting of the Electrochemical Society by F. A. Lowenheim, Metal and Thermit Corporation, on the effect of various metal additions upon the anode behavior of tin. The experiments showed that by incorporating up to about 1 per cent aluminum in tin anodes used in alkaline tin plating, the current densities obtainable can be markedly increased. According to Lowenheim, in any given potassium stannate plating solution, if pure tin anodes operate satisfactorily at a current density of **X** amperes per square foot, a 1 per cent aluminum-tin alloy anode will operate at about the same anode of efficiency at **NX** am-

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By the use of "quick change hangers" Platecoil installations can be made in open tanks in one-half hour or less by one man and a helper.

NO THREADED JOINTS IN TANK

The entire Platecoil is electric welded and pressure tested. There are no joints to corrode or leak. Both connections to the Platecoil can be located above the liquid level where there is no danger of thread corroding and freezing.

GREATER TANK CAPACITY

A 22" x 47" Platecoil gives the same heat transfer surface as 32 feet of 1½" pipe. This pipe requires a space approximately 30" x 60". Platecoil thus saves about 50% over equivalent pipe coil.

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Weighing only about half as much as equivalent pipe coil, Platecoil is easy to handle. A whole maintenance crew is not needed to transport and install Pipecoil.

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More prime surface of Platecoil can be installed in a given area than can be obtained with pipe coil. Thus a more compact Platecoil unit provides much greater BTU transfer per unit area than can be obtained with pipe coil. Quick starts in heating tank solutions mean more hours of productive time.

Kold-Hold Manufacturing Company, Lansing 4, Michigan

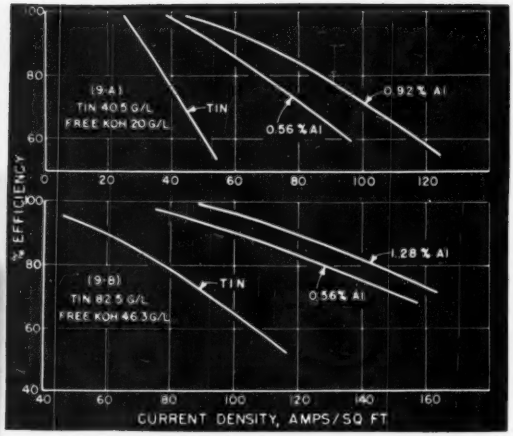


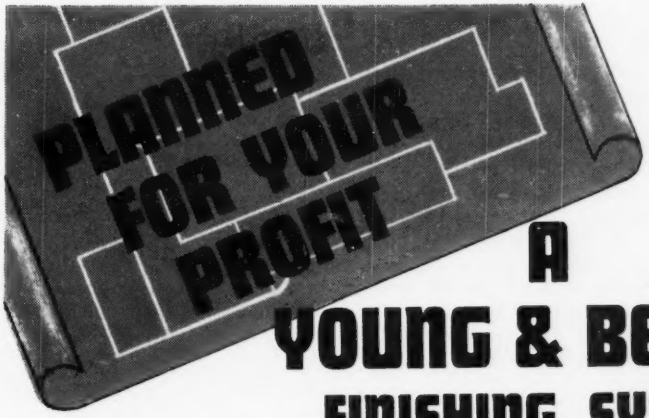
Fig. 12 — Effect of aluminum on anode efficiency of tin in potassium stannate solutions at 90 deg. C., showing increased allowable current density
(Illustration courtesy Electrochemical Society)

peres per square foot, where N equals 1.7 to 3.0.

Although 26 elements were tested as alloying additions to tin anodes, the most interesting results of the investigation concern the alloys of tin with a small amount of aluminum. Aluminum alloys appeared better than any others in regard to anode efficiency, and combine with this anode performance the advantageous qualities of nontoxicity, economy, ease of alloying, favorable mechanical properties of the resulting alloy, and a position in the electromotive series which assures that aluminum will not codeposit with tin at the cathode.

Another advantage cited for the aluminum-tin alloy system was the anode filming characteristics. Most platers know that for proper operation of an alkaline stannate bath the tin anodes must be in a filmed condition. If no film is present the anodes dissolve as bivalent tin or stannite-ion, which, if present in appreciable amounts, produces spongy and non-adherent deposits. One way that has been used to film the anodes is to subject them momentarily to a higher current density than the normal or operating current density; the current then being decreased to the normal operating value. In discussing this point, Lowenheim pointed out that his experiments showed that the aluminum alloy filmed at, or even below, the normal operating current density. The film on the aluminum anode was reported to be considerably darker than that on pure tin, and approached a light khaki color when the anodes were dissolving properly. Whereas a tin anode tends to become black when passivated by too high a current, the aluminum alloy anode first develops a white film which finally changes to black at very high current densities.

In experiments conducted by Lowenheim, eight aluminum-tin alloys were tested in a potassium stannate bath containing 40.5 gm./l. tin and 11.5 gm./l. of free potassium hydroxide, to determine the optimum range of aluminum concentration. These contained 0.1, 0.33, 0.56, 0.92, 1.28, 2.06, and 2.69 per cent aluminum. The tests showed that as little as 0.1 per cent aluminum improved the anode efficiency slightly, but to gain the greatest effect about 1 per cent aluminum should be used. Further increase in aluminum content was found to confer no additional benefit, which was confirmed by additional experiments on 5 and 10 per cent aluminum-tin alloys. Curves given in Fig. 12 based on Lowenheim's work show the effect of aluminum-tin anodes in two concentrations of potassium stannate plating baths.



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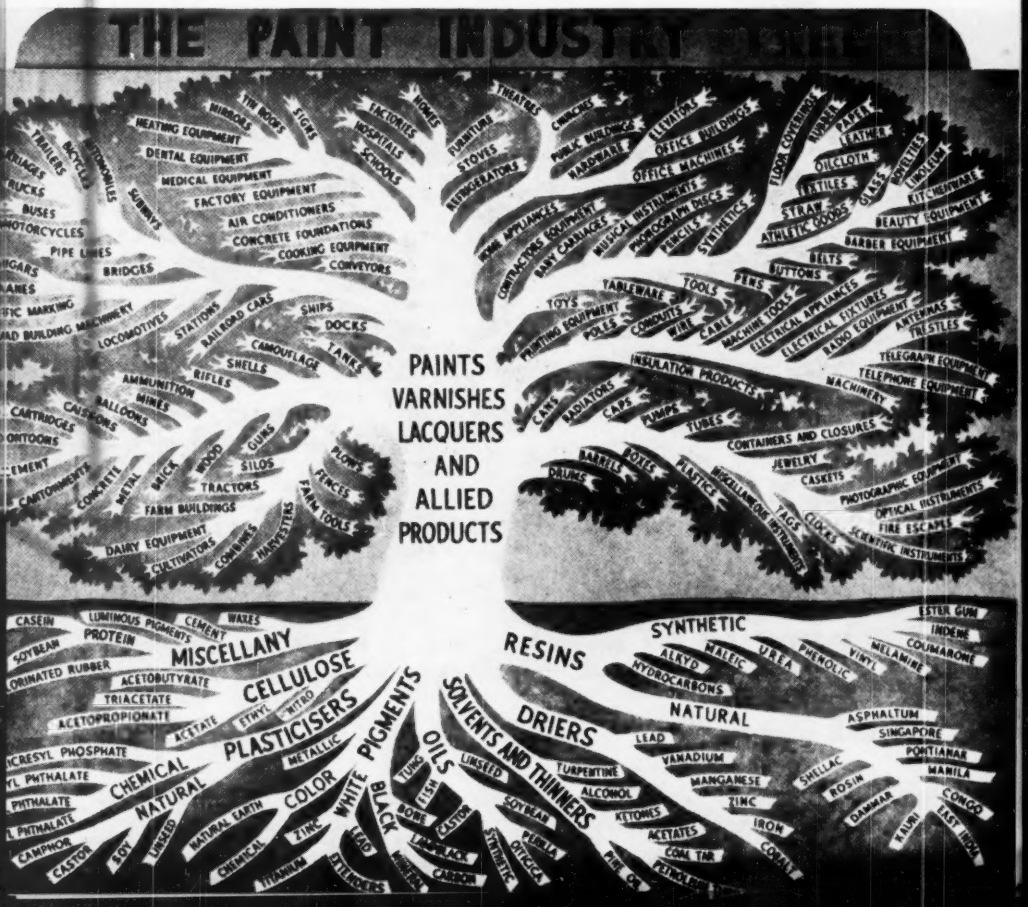
Although Lowenheim's investigation was principally concerned with the potassium stannate plating bath, enough work was done with the sodium stannate solution to show that the benefits of the aluminum alloy are common to both. From the practical angle, Lowenheim predicted that the aluminum-tin alloy (about 1 per cent aluminum) should prove useful in enlarging the range of utility of the potassium stannate bath by bringing the anode efficiency more nearly into line with the higher cathode efficiencies which the potash bath reportedly offers.

Modern, easy-to-keep-clean metal furniture requires a smooth, enduring finish. The coating must have toughness, durability and attractiveness. It must also be acid and alcohol proof.

Industry, today, uses at least six different methods of applying protective and colorful finishes. Lacquers, varnishes and paints are applied by spraying, brushing, dipping, tumbling, roller-coating, and flow-coating. The size, shape, and type of the object to be coated—as well as the quality of finish desired—are all considered in determining the method of finish application.



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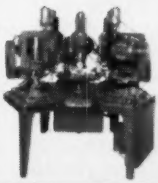
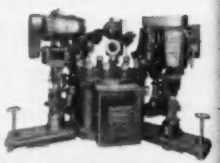


NO. 9-6 ROTARY INDEXING



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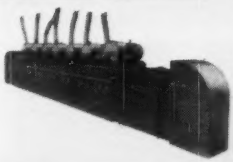
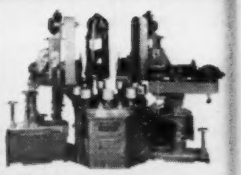
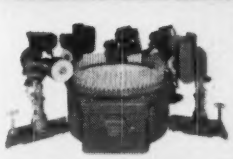


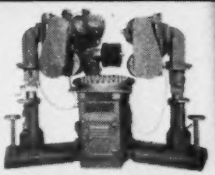
NO. 2 STRAIGHT LINE



NO. 14-9 ROTARY INDEXING



NO. 13 CONTINUOUS ROTARY



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Call on Packer-Matic engineers for information . . . and instruction in up-to-the-minute buffing techniques. Like the performance of our machines, the service of our engineers can help you add hours of efficient production to every working day.

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PRACTICAL APPLICATIONS *of Modern Products*

High Speed Continuous Spray Pickling Machines Process Brass at New Scovill Continuous Strip Mill

THE problem of producing brass coiled stock which will have proper metallurgical and surface finish characteristics has been solved at the new Scovill continuous strip mill by the installation of specially designed annealing furnaces used in connection with automatic high speed spray pickling machines.

The development of the machines dates back to the war years when engineering and experimental work resulted in the building of machines of this type to pickle shell cases after annealing, securing not only the proper surface finish but handling a tremendous number of parts. Many such units of this type were subsequently built for the armament program.

Further engineering and experimen-

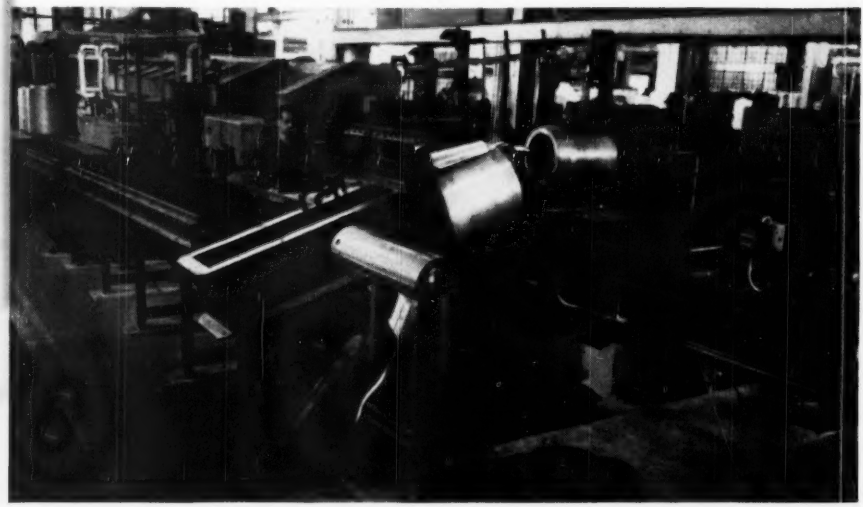


Fig. 1—Illustrated is one of the two Metalwash strip pickling lines installed in the new Scovill plant. The totally enclosed processing unit may be seen in the background of this illustration. *(Photo courtesy Scovill Manufacturing Company, Waterbury, Connecticut)*

tal work resulted in the development of this type of spray pickling equipment for use in brass rolling mills for strip and bar stock. The first units ran at relatively low speed somewhat below 100 feet per minute.

The two spray pickling machines, one of which may be seen in the background of Fig. 1, installed in the new Scovill strip mill, designed and built by Metalwash Machinery Corporation in cooperation with Scovill's engineering staff, will handle brass strip up to 29 inches wide at speeds up to 600 feet per minute. Each one of the 150-foot long machines consists of a coil payoff reel; feed rolls and metal flattener; a series of processing solutions, namely, sulfuric acid, sodium bichromate, cold water, hot water, cleaner tanks, and a hot air dryer. A winding reel for light metal and a coiler for heavier strip are installed at the discharge end of the line.

The pickling and rinsing are all done by pressure spraying, and carry-over of liquids from one tank to another is prevented by a series of air pressure plows. There is no interruption of the process, since a coil of strip fed into the line has an uninterrupted run to conclusion. This produces a uniformly clean surface without overpickling or etching in spots. The lines can be operated at various speeds to suit the nature of the cleaning required.

Advantages of the spray pickling operation over the conventional immersion type include increased productive capacity with a relatively short pickling machine, and the production of brass strip having a better appearance and surface condition than obtained by any other method.

Permanent Record of Oven Temperatures Obtained with Traveling-Oven Thermometer

IN many conveyorized finishing operations involving lacquering, japanning, drying, and baking, the oven temperatures are often critical. Temperature continues to be an important factor in maintaining high quality control and color consistency.

An instrument which is being used successfully in guiding accurate temperature adjustments is a Bristol portable, traveling-oven, recording thermometer, which is manufactured

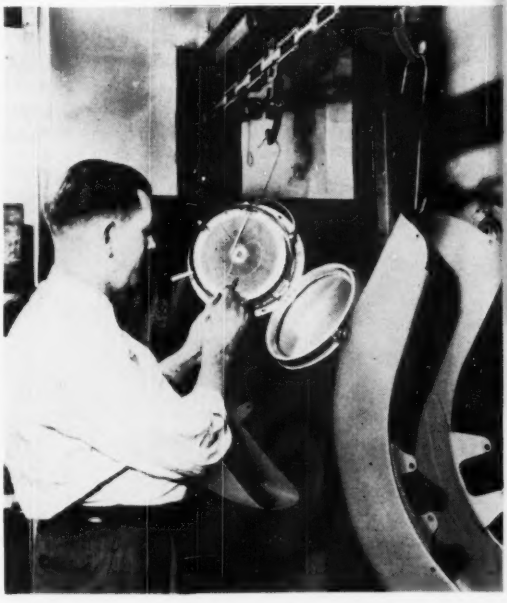


Fig. 1 — Recording thermometer is passed through baking oven along with motorcycle fenders in order to obtain a permanent record of temperatures in the baking cycle during which finish has been cured.

by the Bristol Co., 108 Bristol Rd., Waterbury 91, Conn. The thermometer is a self-contained, compact unit which provides a simple method of obtaining a continuous and permanent record of processing temperatures in conveyor ovens. The recording thermometer is either hung on a load hook or placed on the oven conveyor, and it is passed through the oven along with the work. Thus, a continuous record of temperatures to which the work is subjected as it is passed through the oven is obtained.

No ink is used for the recording mechanism of the instrument; instead, the temperature record is drawn on a carbon-coated chart by means of a stylus. This is the same basic smoked chart recording system which was originated by Bristol many years ago for use on a number of different types of recorders in which liquid inks could not be used for optimum accuracy. After a run, the chart, with the temperature record on it, is removed from the instrument and "fixed" in a solution in order to make the record permanent.

The temperature-sensitive element of the traveling-oven recorder is located on the back of the case where it is exposed directly to the temperatures being measured. This results in maximum sensitivity to temperature changes. The thermometer is calibrated for a temperature range of 100-500 deg. F. and for a time period of 120 minutes.

Shown in Fig. 1 is a traveling-oven recorder in use at the plant of the Harley-Davidson Motor Co., Milwaukee. The thermometer has been passed through the bake oven along with motorcycle fenders, and results from the temperature chart are used to indicate any necessary adjustments to the oven heat controls which must be made.

Three Complete Finishing Systems Combined to Speed Up Oliver Tractor Production

THE tractor finishing layout of the Oliver Corporation, Charles City, Iowa, is virtually three conveyorized systems. All are accurately timed and located so as to deliver their ware at specified assembly points at the proper time. Two monorail continuous conveyors handle wheels, rims and miscellaneous parts, carrying them through the various stages of the finishing process. Despatch wash units, paint spray booths, dry-off and finish bake ovens are strategically located in the conveyor lines for faster, more efficient results. Designed, built and installed by Despatch Oven Company, of

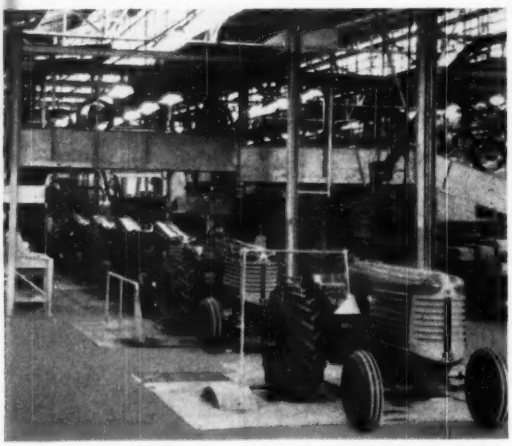
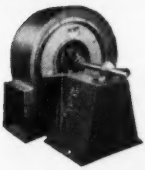
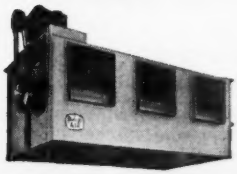


Fig. 1—Attractively painted, assembled Oliver tractors leave the assembly line at the rate of fifteen per hour.
(Photo courtesy Despatch Oven Co., Minneapolis, Minnnesota)





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In the early days of arc welding, this company was quick to adopt it in the manufacture of its products, and today specializes in the extensive use of heavy steel and welded construction.

As a charter member of the NAFM, this company has followed strictly the practice of having its products accurately tested and rated, both in its own laboratory and by disinterested outside engineers.

Today The New York Blower Company offers the facilities of its own completely equipped research laboratory, and a competent engineering staff to furnish engineering recommendations for both industrial and commercial air handling problems of every type.

The homespun phrase of 1889, "Built Right, Run Right," is *still* a good way to describe New York Blower products.

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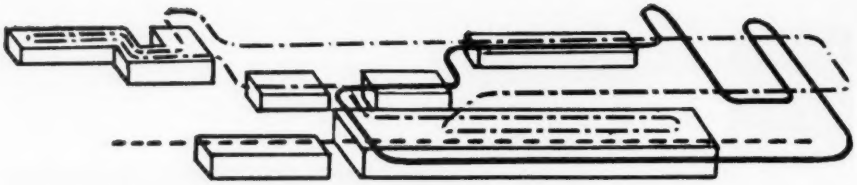

Fig. 2—This schematic drawing shows how the three conveyor systems are located to converge at the common site for assembly operations. Dotted line indicates main assembly line. Chasses represents monorail conveyor for miscellaneous parts and broken line indicates conveyor for wheels, rims and wheel weights.
(Illustration courtesy Despatch Oven Co., Minneapolis, Minnesota)

Minneapolis, Minnesota, this three-unit system is producing fifteen Oliver tractors per hour. This is a 50 per cent increase over previous production with older methods of materials handling.

Plastic Coating Protects Silver Plated Terminals and Armatures

ONE of the most common problems in the electronics industry is the difficulty in protecting armatures and silver plated terminals from being covered by multiple coats of insulating varnish.

The practice is to apply several coats of varnish to the entire unit, including the precision ground laminated metal surface of the armatures as well as the terminal endings, baking each coat of varnish after every application to assure adequate protection of the parts. However, the principal disadvantage of this method is the difficulty in removing the thick and hard baked varnish coatings that cover the terminals and armatures. The common practice in the electronics industry is to chip and scrape the varnish from the precision machined ends of the laminated metal and from the terminal endings so that those parts are completely exposed. Obviously, in addition to being an important reason for rejects due to scratches that appear on the metal surface, this method of removing the varnish is difficult and time consuming.

A special protective coating, developed by the Maas & Waldstein Co., and known as Copeel Clear Strippable Plastic Coating No. 351, is applied to the armatures and terminal endings, prior to varnishing, and is formulated to withstand multiple applications of varnish as well as high baking temperatures.

After the units are completely varnished, a sharp instrument is used to pierce the laminated metal ends of the armatures and the terminal endings. Wherever the Copeel has been applied, the thick hard varnish coats are quickly and easily removed by stripping the Copeel Plastic Coating.

The use of strippable plastic for this purpose should help manufacturers in the electronics industry reduce rejects and finishing costs considerably.

The modern trend in some models of clocks for bedrooms and kitchens is toward enameled cases. To finish these clocks in large volume, including all of the parts, such as bases, backs and bezels (they're the metal rims which hold the crystals!) would be a costly and slow procedure if it were not for conveyorized automatic equipment. For mass production, quality of finish and economy, automatic spray-bake machines are used.

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CORROSION RESISTANCE, PAINT ADHERENCE, FINAL FINISH... BRIGHT, CHROME-LIKE OR COLORED

The only complete line of patented chromate-dip treatments to meet your particular finishing problem.

Iridite *quality* is *tops* in corrosion resistance and paint bond. Iridite finishes are *first* in wide selection of coatings:

BRIGHT: Chrome-like in appearance

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COLORS: Black, Red, Blue, Green

PROCESS METHOD: Simple dip chemical immersion for a matter of seconds

SURFACES: Zinc or cadmium: plated, die cast, galvanized or sheet

COST: The smaller fraction of a penny does a square foot of surface

FREE—Write for literature and samples, and for immediate action, send us a sample of the product you wish to process, along with the outline of your problem.

SPECIAL PROCESSES—*Research and new developments in general metal finishing are being carried forward as manufacturers present new finishing problems for us to work out.* ***Let us go to work on yours.***

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NEWS of the Industry

NEW PLANTS

With the development of an exclusive flat-metal continuous casting process, which produces large rectangular-section brass bars, the **SCOVILL MANUFACTURING COMPANY** of Waterbury, Connecticut, at a cost of over $10,000,000, has just placed in operation the world's most modernly equipped continuous strip mill, capable of producing the heaviest cold-rolled and non-welded brass coils in the industry.

For the brass industry, one of America's oldest metal industries, this new continuous strip mill represents a dream come true: a single plant incorporating all the equipment for producing cold-rolled brass, from continuous casting of large bars to finished mill products packaged for delivery—and all laid out according to the latest engineering methods for efficient, straight-flow production.

Heart of this new continuous strip mill is Scovill's exclusive continuous flat-metal casting machine. Metal to be cast is melted in three electric induction furnaces, each with a capacity of 10,000 pounds per hour. They are the largest in the brass industry and are equipped for precision control of melting temperatures and other factors which influence the metallurgical qualities of the brass.

At staggered 30-minute intervals, each of the three furnaces discharges into a holding furnace of 9000 pounds capacity. This furnace is mounted over the casting machine and provides a continuous flow of molten brass into the machine. The intermixing of the charges from the three furnaces gives additional uniformity of composition to the casting as the metal descends through the water-cooled mold.

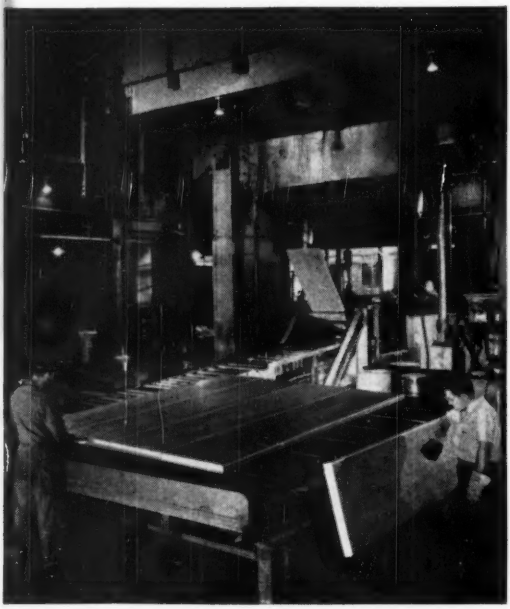


Fig. 1—In the new Scovill plant, the Scovill-engineered, continuous flat-metal casting machine here illustrated can produce millions of pounds per week of clean, structurally sound metal bars. As the bars emerge from the machine, they are automatically sawed into lengths for delivery to the continuous strip mill.

The casting machine itself is of giant size and has a capacity of several million pounds per week. It is the only one of its kind in America, designed to produce flat bars for cold-rolling into brass strip and sheet. As the brass emerges from the machine, it is automatically sawed into bars of uniform length, each one weighing in excess of 2,000 pounds. The conventional operation of shearing or sawing gates from individually cast bars has thus been eliminated, and internally sound metal is assured throughout the entire length, width, and thickness of each bar.

Machinery regulators and materials handling equipment give new concepts of efficiency. Pushbutton control characterizes the heavy equipment, and automaticity is introduced wherever possible. On the cold-rolling mills, for example, spacing between the working rolls is kept constantly uniform by photoelectric controls which compensate for varying temperatures and roll expansion which takes place as rolling progresses. The result is a uniformity of gauge never before attained. Vacuum cup and roller conveyor handling equipment do away with laborious manual handling usually associated with brass mill work, and are big factors in the virtual elimination of dents, pits, gouges and scratches in the metal.

Annealing and cleaning equipment incorporates the most modern devices for producing closely controlled annealed tempers and clean, smooth surfaces. The final annealing furnace and cleaning unit are coupled so that as the strip or sheet emerges from the furnace it is automatically positioned and travels at a controlled speed through the cleaning unit.

Scovill's new continuous strip mill produces continuous-cast and cold-rolled brass strip which not only meets the close engineering requirements of today, but also combines most uniform structural soundness of metal with heaviest non-welded coils in the industry.

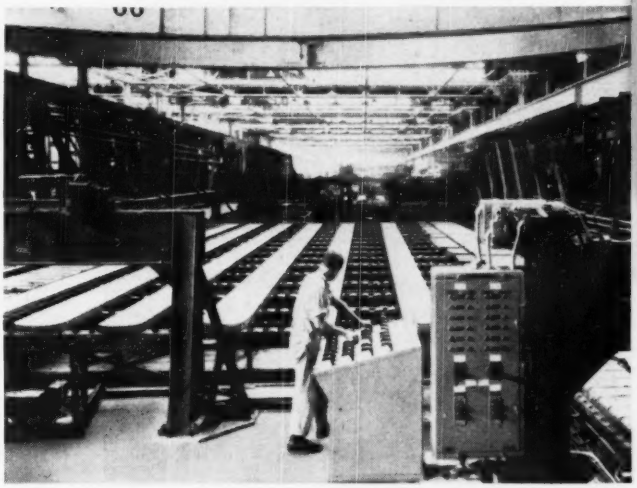


Fig. 2—A view of one part of the Scovill continuous strip mill. The new Waterbury, Conn., plant houses a working area of more than 200,000 square feet of floor space.

Theodore F. Onkey, president of **THE McALEER MFG. CO. LTD. OF CANADA,** manufacturer of Roberts "Greaseless" and regular buffing compounds, has announced the purchase of a three-story building with railroad siding at New Toronto, Ontario. The building comprises 12,000 square feet with additional smaller buildings for the storage of raw materials. After receiving new equipment and modernizing, the company will be moved from its present quarters at Chatham, Ontario.

Harry Kirkham has been appointed office manager, and the operations will be supervised by Alex G. Clark, treasurer of the corporation.

COMPANIES

THE ELECTRO CHEMICAL SUPPLY & ENGINEERING COMPANY has announced the removal of its offices from Paoli, Pennsylvania, to its new office and plant at 750 Broad Street, Emmaus (Allentown), Pennsylvania. The new facilities will enable the company to provide prompt engineering service.

THE BINKS MANUFACTURING CO., 3118-40 Carroll Ave., Chicago 12, Ill., is now offering a finishing methods research service whereby a manufacturer can determine without obligation whether or not his products can be spray finished automatically. If so, the manufacturer will be given a report showing the production and cost which can be expected based upon actual measurement.

Occupying an entire floor of a large addition to the Chicago plant, the Finishing Methods Research Department is equipped to run comprehensive tests on

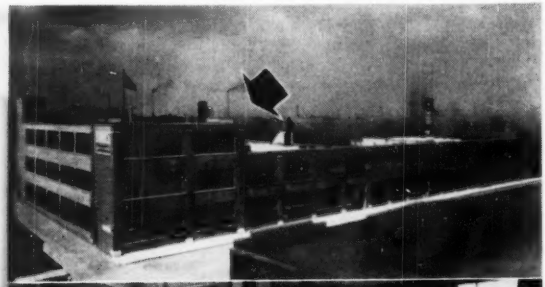


Fig. 1—A fully equipped Finishing Methods Research Department is housed in a new three story addition to the Binks Manufacturing Company (indicated by arrow). It has been established to help manufacturers find better and faster ways to apply quality finishes to their particular products. There is no charge for this service.

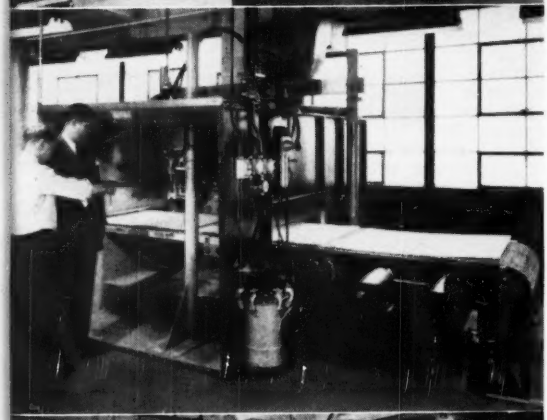


Fig. 2—Automatic Reciprocating Machine for finishing all types of flat surfaces. The use of such a machine cuts production time, saves paint, and results in a finer finish.

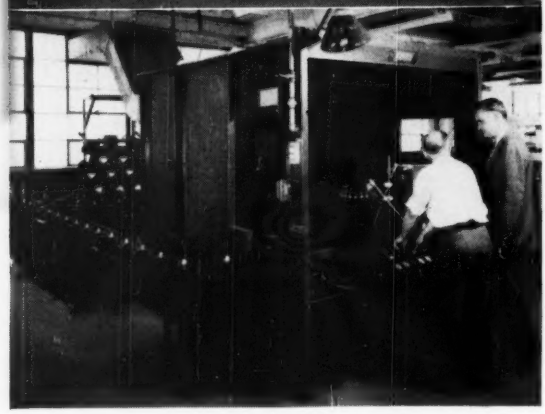


Fig. 3 — An Automatic Spindle Machine for finishing round, cylindrical, or irregularly shaped objects. The product to be finished is mounted on conveyor spindles. These rotate in front of the spray guns.

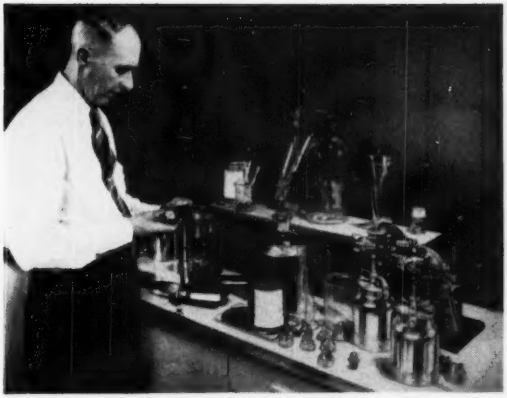


Fig. 4—A Binks engineer measures the viscosity of a paint sample to determine the right nozzle setup for its application. This is another service of Binks' Finishing Methods Research Department.

actual products, using the latest standard automatic and manual spray finishing equipment. According to Burke B. Roche, president, the department will devote its full time to helping manufacturers reduce finishing costs and improve quality.

MACDERMID INCORPORATED, Waterbury, Conn., has announced the appointment of Shepard & Kent, Inc., 3132 E. Washington Blvd., Los Angeles 23, Calif., as West Coast distributor for its line of metal finishing products.

G. Suart Krentel, MacDermid West Coast technical sales representative, became associated with Shepard & Kent in December and will continue to service former MacDermid customers as well as assuming his new responsibilities.

A combined development and customer service laboratory, recently completed and equipped at the plant of the **PRODUCTION MACHINE COMPANY,** Greenfield, Mass., now makes it possible for company engineers to make adaptations of their centerless polishing machines and straight-line surfacing ma-

Fig. 1—A view of one section of Production Machine Company's customer service laboratory, showing four models of finishing machines employing abrasive belts. As can be noted, some models of the machines are designed so that the belt runs horizontally, or, if floor space is at a premium, or if the job requires, models of the machines are available on which the belt runs vertically.

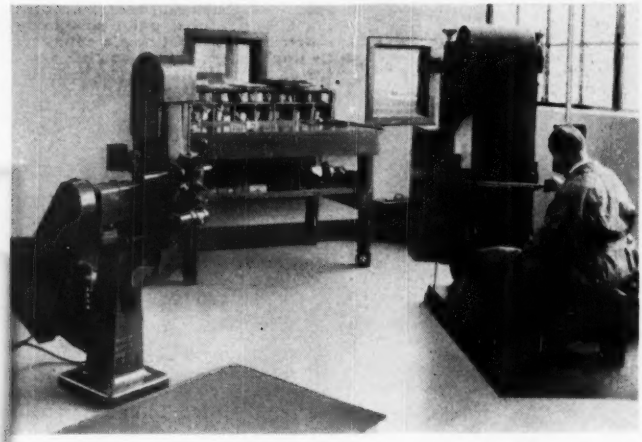


Fig. 2—Another view of the laboratory showing two finishing machines on which the abrasive belts operate vertically

chines as required by customer needs, and perform demonstrations for customers so that actual production results can be observed. As can be noted in the accompanying illustrations, various models of the machines are on display, ready to operate at a moment's notice.

The centerless polishing and buffing machines for rods, tubes, bars, and special shapes, employing polishing and buffing wheels, abrasive belts, or felt belts, have been adapted for polishing and finishing a wide variety of products: hardware, small tools, taps, augur bits, wrenches, and so on, automobile radio and television aerials, lipstick holders, perfume dispensers, rolling pins, baseball bats, rubber and fibre caster wheels, fishing rods, gun barrels, tapered golf shafts, crochet and darning needles.

AZED, INC., Waukegan, Ill., has recently appointed J. H. Overpeck Co., 1112 House Bldg., Pittsburgh, as its distributor in western Pennsylvania, eastern Ohio, and part of northern West Virginia.

A new laboratory complete with the most modern equipment for research and testing in the metal finishing field has recently been added by **THE CHEMICAL CORP.**, Springfield, Mass. The company manufactures Luster-on Zinc Bright Dip and several other metal finishing specialty products, and distributes a full line of platers' equipment and supplies, including Pennsalt Cleaners, exclusively in New England.

K. P. Bellinger, vice president in charge of metal finishing, has stated that development work now being carried on in the new laboratory is expected to result in the early announcement of several new products.

The **EDWIN L. WIEGAND CO.**, Pittsburgh, Pa., has announced that the name of its Boston representative has been changed from Howard C. Jones & Associates, 683 Atlantic Ave., Boston 11, Mass., to Leo C. Pelkus & Company.

Mr. Jones, who has had many years' association with the electric industry in New England, will remain with the new organization, which will be headed by Mr. Pelkus.

Mr. Pelkus is a graduate of M.I.T., and has a great deal of experience in the electric heating field, having been with the Howard C. Jones organization for several years, as well as operating his own business.

Wilfred S. McKeon, president of **SULPHUR PRODUCTS COMPANY**, Greensburg, Pennsylvania, is once again resuming his duties, after a hospitalization of three weeks.

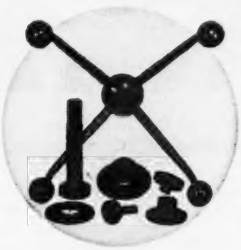
NEW POSITIONS

John A. Bauer, vice president and sales manager of the Hanson-Van Winkle-Munning Company, has announced the following changes in the sales department:

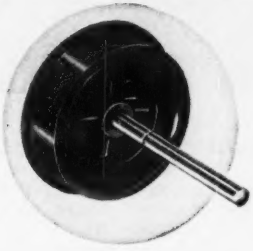
BLACK MAGIC

ECONOMICAL -- ATTRACTIVE -- PROTECTIVE CHEMICAL FINISHES

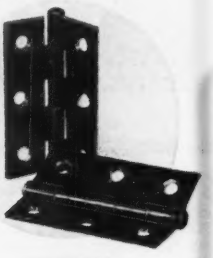
FOR FERROUS AND NONFERROUS METALS



STEEL



ZINC

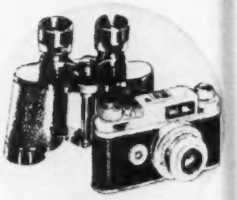


CADMIUM

ONE BATH PROCESSES

SIMPLE TO OPERATE — ECONOMICAL TO USE

1. BLACK MAGIC Processes afford a rich, permanent black finish integral with the metal surface; will not chip, flake or peel.
2. Resistant to heat and thermal shock.
3. No dimensional change.
4. Sales appeal and service life.
5. Optical black finish.



COPPER & BRASS

HEAT TREATING MATERIALS

QUICK-CARB, No. 20 — No. 40 — No. 60, Liquid Bath Carburizing Salts.

QUICK-TEMPER TEMPERING AND DRAWING SALTS — 275° F. and 420° F. Melting Points.

NEUTRAL SALTS—For Complete Range of Temperatures.

METAL CLEANERS

Cleaner No. 7 Still, soak cleaner
Cleaner No. 9 Heavy duty soak cleaner
Cleaner No. 12 Reverse current cleaner
Cleaner No. 20 Non-etching Aluminum Cleaner
Cleaner No. 30 Etching-type Aluminum Cleaner
Cleaner No. 25 Brass Cleaner (non-oxidizing)
Cleaner No. 66 Solvent Cleaner (emsulsion type)

Special Cleaners—formulated for specific applications.

PROTECTIVE FILM FINISHES

WITCH-DIP, Wax Base Compound

WITCH-OIL, Water Displacing Corrosion Inhibiting Oil

FINISH No. 146, Hard Protective Coating and Paint Bond

SILCO—An inorganic, low-temperature bake, vitreous type finish. Rust, acid and abrasion resistant. All colors.

Send for the BLACK BOOK

It contains the story of Black-Magic Finishes, with formulas, etc.; also data on all other Black-Magic specialties. Free. Send today.

MITCHELL-BRADFORD CHEMICAL COMPANY

MODERN METAL FINISHES

• 2446D MAIN ST., STRATFORD, CONN. •

BLACK-MAGIC OXIDE BLACKING SALTS
WITCH-DIP & WITCH-OIL FINAL FINISHES

SILCO *Glass-Base* PROTECTIVE COATING
HEAT TREATING SALTS, CLEANERS, ETC.

(Left to right) P. R. Lyons, Gordon R. Lyons, Martvig J. Moll, Wilfred G. Cryderman, Irving A. Gemmell

P. R. LYONS, previously district manager of Ohio, has become manager of electrical sales with headquarters in Matawan. A graduate of Armour Institute in Chicago, he joined A. P. Munning & Company in 1925, specializing in conveyor sales in the Chicago territory. He continued in this post, after the merger of A. P. Munning & Company with the Hanson and Van Winkle Company, which formed the present H-VW-M Company, until 1931 when he was appointed district manager for Ohio.

MARTVIG J. MOLL has been named manager of conveyor sales. He obtained his engineering education at Columbia University and joined H-VW-M in 1923 to work on the Munning Full Automatic Conveyor. One of the pioneers in this field, Mr. Moll has continued to be active in it throughout the years.

Assisting Mr. Moll will be **IRVING A. GEMMELL,** who joined the A. P. Munning Company after his graduation from Pratt Institute in chemical engineering. Since the conclusion of his work on special equipment projects involved in the war effort, he has concentrated on automatic equipment sales, and in his new post will continue to work in the equipment field.

Transferred to the Cleveland office was **WILFRED G. CRYDERMAN,** who formerly covered the southern Ohio territory. A graduate of Michigan State College with a B. S. degree in mechanical engineering, he joined the company in 1946 as Dayton sales representative and served in that capacity until his present transfer.

Replacing Mr. Cryderman, **GORDON R. LYONS** will now work in general sales with headquarters in Dayton, Ohio. He joined H-VW-M following his graduation from the Case Institute of Technology, Cleveland, Ohio.

Robert C. Stanley, chairman of the board of directors of the International Nickel Company of Canada, Limited, has announced the election of **R. EWART STAVERT** of Montreal as a director of the company.

President of The Consolidated Mining and Smelting Company of Canada, Limited, since April 1945, Mr. Stavert joined the firm in 1934 as assistant to the president. He was appointed vice president at Montreal in 1939 and elected vice president of the company in 1941.

Appointment of **JOSEPH B. DIETZ** as manager of the industrial sales section of the Finishes Division of the Du Pont Company has been announced. He succeeds Henry E. Lackey, who is retiring after a career of nearly 43 years.

Mr. Dietz, formerly assistant industrial sales manager, joined the Du Pont Company at Philadelphia in 1924 as a control chemist. He came to the Wilmington headquarters of the Finishes Division in 1945.

Other changes in the Finishes Division are as follows: **WILLIAM P. FISHER, JR.,** since 1947 industrial sales manager in the Chicago region, has been transferred to Wilmington as assistant manager of industrial sales; **WILLIAM E. KREUER,** since 1947 industrial sales manager in the Cleveland region, has been transferred to Chicago in the same capacity; **RICHARD N. SANGER,** since 1946 industrial technical supervisor at Cleveland, has been appointed industrial sales manager at Cleveland; **WALTER S. WOODS, II,** an industrial salesman in the Chicago region since 1939, has been appointed industrial sales supervisor at Cleveland.

FLOCK

SHORT-CUT fibres of all types used to produce effects of suede, felt, velvet, mohair, velour, carpet on any surface in an economical manner.

LET our 25 years experience be your guide to quality results at lowest possible cost.

Rayon Processing Co. of R. I., Inc.

PIONEER PRODUCERS OF SURFACE COATING FLOCKS

65 MOSHASSUCK STREET • **PAWTUCKET, R. I.**

POLLAK PAINT CO.
715 Main St.
Buffalo, N. Y.

LAMBERT-NEW ENGLAND CO.
79 Sudbury St.
Boston, Mass.

H. R. MEININGER CO.
409 16th St.
Denver, Colo.

J. GORDON SMITH CO.
3901 Main St.
Dallas, Texas

The Hanson - Van Winkle - Munning Company has announced the advancement of two members of its laboratory staff, **DR. D. GARDNER FOULKE** and **THOMAS J. MENZEL.**

Dr. Foulke has been appointed chief chemist in charge of analysis and customer service. He has held the post of process electrochemist for the past three years and continues to be responsible for

Dr. D. Gardner Foulke, Thomas J. Menzel

a number of the company's special processes. His prior experience includes teaching, research, and work in the steel industry.

Thomas Menzel has been advanced to the position of plating chemist. For the past several years he has been in charge of analytical work and customers' service work. In his new position he will be responsible for all experimental and process plating in H-VW-M's new plating laboratory.

Allied Finishing Specialties Co., Chicago, Ill., manufacturer of industrial protective coatings, has announced the appointment of **L. R. NYKAMP,** 5407 Lake Shore Drive, Holland, Mich., as sales representative in the western half of Michigan.

In the paint field for almost two decades, Mr. Nykamp will also represent Alabastine Paint Products which was moved from Grand Rapids, Michigan, to Chicago early in 1949 and consolidated with the Chicago Bronze & Color Works, manufacturer of all types of paint products sold through dealers.

Mr. Nykamp will contact dealers and will call on industrial firms for the Allied concern.

DUDLEY B. BLAKE has been appointed general sales manager of the United Lacquer Manufacturing Corp., Linden, N. J., and Everett, Mass., manufacturer of industrial finishes, synthetics, and paints.

Dudley B. Blake

Mr. Blake, who will supervise industrial sales promotion and a concentrated national expansion program, was formerly vice president in charge of sales of the Monroe Sander Corporation.

A. M. Callis, general sales manager of Federated Metals Division, American Smelting and Refining Company, has announced the appointment of **SHERMAN M. GOBLE** as manager of its new Plating and Electrochemical Department. This department was organized to facilitate sales and service.

Mr. Goble's headquarters will be at 120 Broadway, New York City.

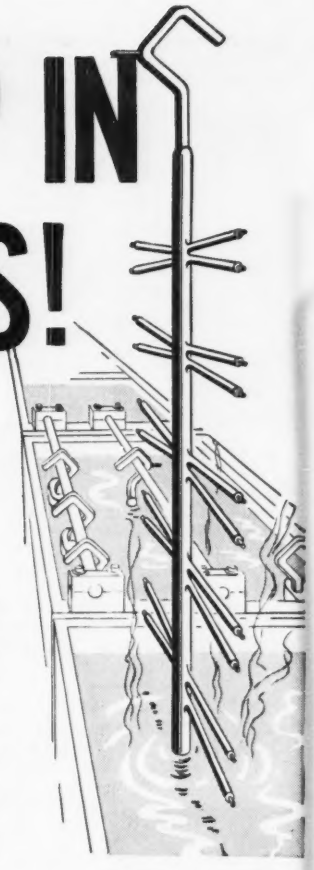
Mr. Goble brings to his new position many years of experience in the plating field. Previously he was associated with Seymour Mfg. Co., McGean Chemical Co., and the Lea Mfg. Company.

The Electric Products Co., Cleveland, Ohio, has appointed the **WILLIAM E. BRICE CO.,** Houston, Tex., as district representative for southern Texas.

William E. Brice

William E. Brice, who heads that organization, is a graduate electrical engineer of Rice Institute, and was formerly associated with the General Electric Company, Houston Lighting and Power Company, and the Wilson Electric Equipment Company.

STANDS UP IN ALL CYCLES!



Outstanding rack protection achieved by plastisol Unichrome COATING 218X

No matter what you need in rack protective qualities, Coating 218X has it. Resistance to vapor degreasing? Coating 218X has that! Ability to stand up in hot cyanides or caustics? In chromium plating? Again 218X is the answer. And if it can withstand *those* plating operations, it will take them *all.*

In test runs at a well known plating plant, for example, Coating 218X was put through a cycle including soak cleaners, anodic alkaline cleaner, cyanide dip, acid dips, nickel plate, chromium plate and chromium strip. There was still no attack after *840 cycles,* at which time the attempt to break down Coating 218X was abandoned!

Physically, too, Coating 218X leads. It won't chip, resists cutting and abrasion, minimizes dragout. All in all, it's easy to see why your rack coating costs will hit bottom with Coating 218X. Write today for prices.

(NOTE: Applicators nearby can bake 218X onto your racks if you have no facilities for applying it. Ask for names.)

UNICHROME

Trade Mark

RACK COATINGS—Products of

UNITED CHROMIUM, INCORPORATED • 51 E. 42nd St., New York 17, N.Y.

Ferndale Sta., Detroit 20, Mich. • Waterbury 90, Conn. • Chicago 4, Ill. • Los Angeles 13, Cal.

In Canada: UNITED CHROMIUM LIMITED, Toronto, Ont.

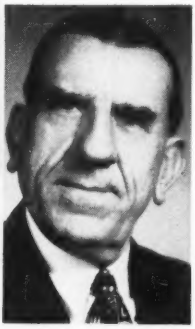
Appointment of **GEORGE S. FORBES** as manager of the Glidden Company's Cleveland Industrial Sales Division has been announced by A. D. Duncan, vice president. Mr. Forbes succeeds **EDWARD C. SHURTLEFF**, who has retired after 46 years' service with the firm.

George S. Forbes

Mr. Shurtleff began his sales career with Glidden in 1904 and was named manager of the Cleveland Industrial Sales Division in 1929 after serving in important accounting and sales promotion positions.

A graduate of Ohio University, Mr. Forbes joined Glidden in 1939, serving as a technical correspondent and later as assistant sales manager of the company's Reading, Pennsylvania Division. After service in the Navy, he was named industrial salesman in the Detroit territory, and since July had been serving as Mr. Shurtleff's assistant.

At a special meeting of the directors **CHARLES E. CROWLEY** was elected president of the Alsop Engineering Corp., Milldale, Conn., succeeding the late Samuel Alsop, Sr. Mr. Crowley has been associated with the concern for the past 27 years.



Charles E. Crowley

Other officers of the company are Samuel Alsop, Jr., first vice president; W. W. Freystedt, second vice president; James J. O'Shea, third vice president; E. Z. Ross, secretary and treasurer; and C. Clark Morganson, assistant secretary.

Alsop Engineering Corporation is engaged in the manufacture of liquid processing equipment, including filters, mixers, agitators, pumps, and stainless tanks.

Richard P. Carlton, recently elected president of the Minnesota Mining & Manufacturing Co., St. Paul 6, Minn., has announced that **LLOYD A. HATCH**, vice president formerly in charge of the firm's roofing granule division, has been assigned the job of coordinating research and new product development.

CLARENCE B. SAMPAIR, vice president in charge of production, will also be in charge of labor relations, and **C. P. PESEK**, vice president in charge of engineering, will also direct engineering and related operations.

Appointment of **CLARENCE J. KRUEGER** as production manager for the paint division of Pittsburgh Plate Glass Company has been announced by E. D. Griffin, vice president.

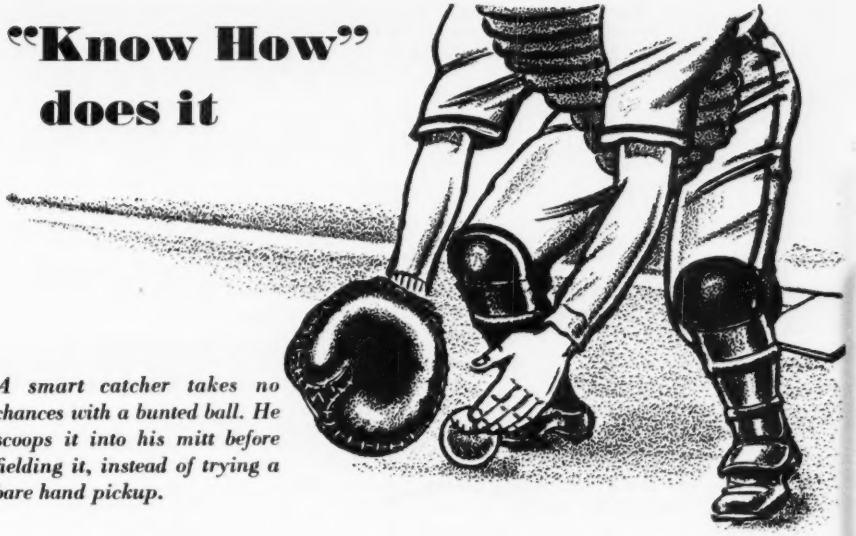
Clarence J. Krueger

Associated with the firm since 1927, Mr. Krueger has served as assistant divisional director of the Ditzler Color Division during the past three years. His first position with Pittsburgh's paint division was as a research chemist at the Milwaukee, Wisconsin plant.

Hercules Powder Company, Wilmington, Delaware, has announced the retirement of Charles A. Lambert, manager of the Hattiesburg, Miss., naval stores plant. **L. COLEMAN HALL**, formerly plant superintendent, succeeds Mr. Lambert as plant manager. **FRANK W. VOLK**, formerly assistant plant superintendent, is now plant superintendent and **LYLE W. ROTHENBERGER**, formerly assistant to Mr. Hall, became assistant plant superintendent.

Mr. Hall joined Hercules in 1916. He spent his first year with the company as a shift chemist at the Curtis Bay, Md., acetone plant which Hercules operated during World War I. Then, he transferred as a shift chemist to the plant at San Diego, Cal., another acetone plant built to cope with World War I emergencies. After several promotions, he went to the company offices in Wilmington as a mem-

"Know How" does it



A smart catcher takes no chances with a bunted ball. He scoops it into his mitt before fielding it, instead of trying a bare hand pickup.

Get the "Know How" of Torit experience and design with **Torit Dust Collectors**

Like smart catchers you, too, cannot afford to take chances. Abrasive dusts in your plant lower employee morale, and damage machinery and finished parts. They will be eliminated when you use Torit Dust Collectors.

Self-contained Torit Dust Collectors fit every production layout. Initial installation expenses are low and operating and maintenance costs are most economical.

If you use standard grinding, polishing and cut-off machines, a Torit Dust Collector for your needs is immediately available. Torit experience can also create special adaptations for special problems. It will pay you to outline your problem to:

TORIT

Manufacturing Co.

314 Walnut St., St. Paul 2, Minn

P. S. Also ask for the latest Torit catalog

ber of the sales development division. When the naval stores plant at Hattiesburg was built, Mr. Hall was named its chief chemist. In 1941 he became plant superintendent. Mr. Hall is a member of the American Chemical Society.

Both Mr. Volk and Mr. Rothenberger have been associated with Hercules and the naval stores industry for a long time. Mr. Volk joined Hercules in 1923, entered the naval stores field a year later. Mr. Rothenberger joined the company in 1937 and moved to naval stores work in 1938.

HONORS

THEODORE Z. VOYDA, chief chemist of the Apothecaries Hall Co., Waterbury, Conn., was recently initiated into the Society of the Sigma Xi, a national honor society devoted to promotion of research in science.

Mr. Voyda has been engaged in metal finishing activities for the past ten years, and was formerly supervisor in charge of electrochemical research and development at Pratt and Whitney Aircraft. He is well-known in plating circles, having read papers pertaining to metal finishing before national convention and branch groups of the American Electroplaters' Society.

TRAINING COURSES

Five intensive one-week courses for industrial finishers are included in the **DeVILBISS SCHOOL OF SPRAY PAINTING** curriculum for the first half of 1950. Maintained as a service to all users of DeVilbiss equipment, the tuition-free courses include comprehensive instruction on all spray painting techniques and the function and care of spray equipment.

Classes will begin on January 23, March 27, April 17, May 8, and June 19, with all courses covering the same subject matter. Since class size is limited, reservations should be made as early as possible with The DeVilbiss Co., 300 Phillips Ave., Toledo 1, Ohio.

MEETINGS

The 12th Annual Educational Session and Dinner Dance of the **GRAND RAPIDS BRANCH** of the **A.E.S.** will be held Saturday, January 28, in the Pantlind Hotel. Chairman will be W. M. Phillips, head of the electrochemistry department of General Motors Research.

Beginning at 2:00 p.m., the program will include the following papers: "A.E.S. Research Grows Up," by W. M. Tucker, chairman of the Research Committee, A.E.S.; "The Reporting and Use of Research Data," by G. M. Cole, Ternstedt Division, General Motors Corporation; and "Current and Metal Distribution in Commercial Applications," by Dr. R. A. Schaefer, Cleveland Graphite Bronze Company.

SOCIETIES

THE PHILADELPHIA PAINT AND VARNISH PRODUCTION CLUB through its Scholarship Committee has established a Fellowship at the Lehigh Institute of Research, Bethlehem, Pa., for the design of speedier and more efficient mixing equipment for use in the manufacture of pastes, for thinning pastes to paint consistency, for tinting paints, and for thinning or blending varnishes.

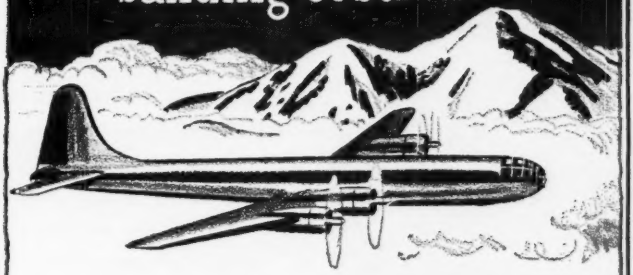
The research project will be carried on under the direct supervision of Professor D. E. Mack, a graduate chemical engineer who is working towards his doctorate.

THE PAINT & VARNISH EXCHANGE CLUB, INC., held a special meeting at the Taft Hotel, New York City, recently at which over forty members and guests were present. The following officers were elected: president, Benjamin Joachim; vice president, Jack Binswanger; secretary, Dana Johnson; treasurer, Thomas Curran. The board of directors consists of the four new officers with Benjamin Einhorn as the fifth director.

NECROLOGY

ERNEST RICHARDSON, retired president and co-founder of the Ingram-Richardson Manufacturing Co., Beaver Falls, Pa., died Friday, November 11. Also a vice president of Ingram-Richardson Manufacturing Company of Indiana, Inc., Frankfort, Ind., he was widely known in industrial circles.

Up in the air over sanding costs?...



...try JEWEL ABRASIVES

The sleek stainless steel skin used in large quantities for aircraft is finished faster, at less cost, with specially designed Jewel silicon carbide paper belts.

Aluminum alloy castings are finished more efficiently in a major aircraft plant with Silver Streak belts. Like all Jewel belts, they have AP's exclusive smooth-running Velvet Joint.

Remember, there's a Jewel product for every sanding, polishing and grinding need.

Abrasive Products, Inc.

SOUTH BRAINTREE 85, MASSACHUSETTS

ABRASIVE PRODUCTS, INC. JEWEL ABRASIVES SOUTH BRAINTREE, MASS. U.S.A.

There's a JEWEL ABRASIVE for Every Polishing and Finishing Need

BELTS
DISKS
SHEETS
SPECIAL SHAPES
Cloth, Paper, Fibre or Combination Backing

BUY THROUGH YOUR INDUSTRIAL DISTRIBUTOR

The Platinum Group Metals—platinum, palladium, rhodium, ruthenium, and iridium—are recovered as by-products during the refining of nickel and copper. Many tons of ore are required in order to produce a single ounce of these rare and precious metals.

The housewife looking at the gleaming exterior finish of her kitchen range, seldom realizes the extent of the protection given to its concealed parts. Back assemblies, service drawers, brackets, lugs, and braces constitute about 50 per cent of the range fabrication. These are usually given a baked enamel coating which acts as a sealer against water and other condensates—thus serving as a rust-preventive.

Iridium is one of the heaviest and stiffest elements, and a six-inch cube of this material weighs approximately 175 pounds.

Finishes

The "Cory Matic Maid," a new portable dishwasher, is fabricated from heavy gauge metal and finished inside and out in glistening white enamel.

(Photo courtesy Cory Corp., Chicago 1, Ill.)

Features of the new Perfection all-automatic electric range include: white titanium porcelain enamel oven lining; polished aluminum broiler pan; white porcelain exterior finish over special enameling steel.

(Photo courtesy Perfection Stove Co., Cleveland 4, Ohio)

that aid in appearance and utility

The phosphor bronze barrel and piston tube of the "Sporter" pneumatic rifle is finished with sprayed-on Paladin Black enamel; the aluminum receiver is finished in natural aluminum color by the Roto-Finish Process.

(Photo courtesy Sheridan Products, Inc., Racine, Wis.)

White baked enamel is the finish used on the chassis and wringer of the Apex Spiral Dasher Washer; chromium plated trim separates the chassis and the tub; the tub is coated with white porcelain enamel.

(Photo courtesy Apex Rotarex Corp., Cleveland 10, Ohio)

BINKS SPRAY SYSTEMS

3 ways to better finishes... faster

Uniform, fine finishing **Fast, economical operation**

Long, trouble free life

Binks "Big 3" spray guns are the favorites of industry everywhere. They lead the way to better finishes... faster. When Binks precision-made guns are on the job, you know that a fine, smooth finish will enhance the value of your product; rejects will be cut to a minimum; production will be greater... costs lower.

Take hold of a Binks spray gun... any one of them. Feel its perfect balance. Pull back the smooth, easy-operating trigger. Note the fast uniform coverage of its adjustable spray pattern... the convenient back-of-gun location for controls... the precision construction of all parts. Tough drop-forged bronze is used for the head and air nozzle. The material nozzle is made of hardened steel with self-centering needle. As a result of such sound engineering and manufacturing know-how, Binks guns stand up under hard production use... that's extra economy for you. Remember, too, that Binks has a full line of integrated finishing equipment from guns to finishing systems.

Ask the Binks Finishing Methods Research Department for help on your finishing problems. Whatever finish you use, or product you make, this new Binks Department will suggest methods for obtaining better, faster, more economical results... at no cost to you.

"Binks is justly proud of its 'Big 3' production guns. They produce, at minimum cost, the high quality finishes demanded by the buying public."

J. G. Roche
Chairman of the Board

Write now for free information on these guns.

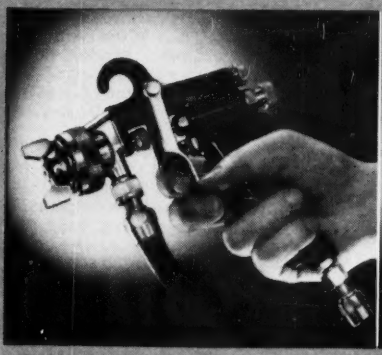
Binks MANUFACTURING COMPANY

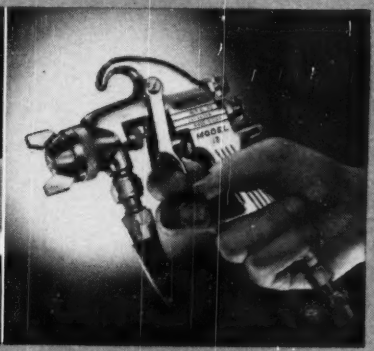
3118-40 Carroll Ave., Chicago 12, Ill.

NEW YORK DETROIT LOS ANGELES ATLANTA BOSTON CLEVELAND
DALLAS MILWAUKEE NASHVILLE PHILADELPHIA PITTSBURGH
ST. LOUIS SAN FRANCISCO SEATTLE WINDSOR, ONTARIO, CANADA

1st way ... use a Model 18

latest addition to the Binks line...a precision gun for obtaining the finest finishes possible at the lowest cost. In designing this gun, Binks asked users what they wanted in a spray gun. Model 18 is the answer.



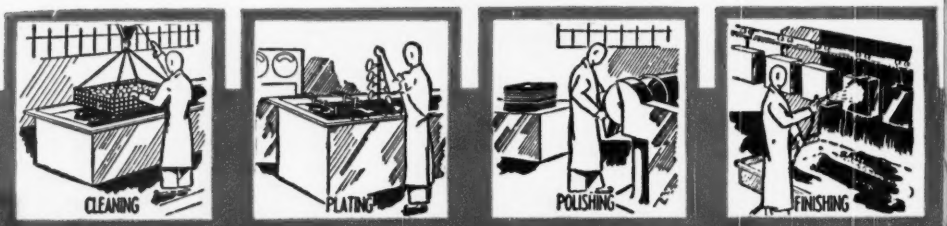


2nd way... use a Model 7

a heavy-duty production gun. This is a long time favorite with wide acceptance in the finishing field. Gun body is drop-forged aluminum with a tough, black electrolytic coating. All parts are of long lasting, wear resistant materials.

3rd way... use a Model 19

a truly remarkable, lightweight production spray gun, employing the same nozzles as Model 18. Reduces fatigue. Body is nickel-plated aluminum. Cartridge-type air valve is economical, easily replaced as a unit.



New • EQUIPMENT • MATERIALS • PROCESSES

Kwiksoak No. 2 Synthetic Type Cleaner

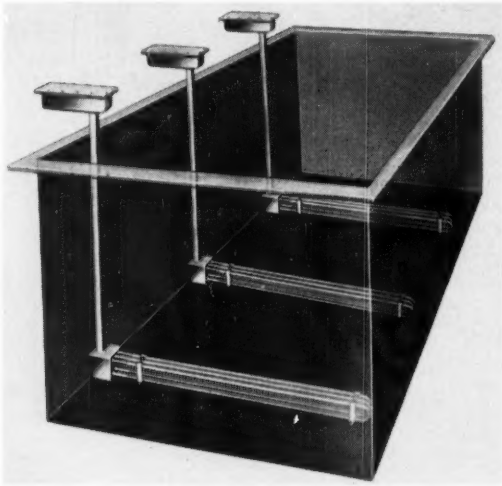
Developed specifically for use in cleaning operations employed following polishing and buffing with Solubar compositions, a synthetic type cleaner designated as Kwiksoak No. 2 is being offered to the finishing industry by the Apley N. Austin Co., 75 Federal St., Boston 10, Massachusetts.

The manufacturer claims that Kwiksoak No. 2, a liquid soap cleaner, will not tarnish any metal during the cleaning process and will, by reason of its thorough cleaning action and free rinsing properties, leave metal surfaces clean and ready to be processed through the next step of the finishing operation.

Chromalox Portable Tank Immersion Heater

The Chromalox Portable Tank Immersion Heater for heating oil and water solutions, tar, paraffin, glue, solvent cleaners, and other similar compounds has been developed by the Edwin L. Wiegand Co., 7552 Thomas Blvd., Pittsburgh 8, Pennsylvania.

The heater is rated from 2 to 18 kilowatts, 115 or 550 volts, single or 3-phase. Copper, steel, Inconel, or stainless steel sheath is available, depending upon the corrosive properties of the solution to be heated. The heating elements at the bottom of the vertical riser range in length from 12½ to 53 inches in straight sections, and may also be supplied in a circular shape to accommodate usage in round tanks with a minimum opening



Chromalox Portable Tank Immersion Heater

of 10½ inches. The riser can be fabricated in varying lengths to suit any tank depth.

The heated section can be had with either two or three hairpin elements. Two-element heaters are designed for a uniform dissipation of heat over the length of the tank; three-element heaters afford a high concentration of heat in confined areas.

A gasketed, liquid-tight terminal box, with heat and acid-resistant coating, is mounted atop the riser for rigid conduit line connections. It also protects against moisture, vapor, and drippings.

Sludge legs are available for installation by the user, to prevent overheating where sludge may accumulate on the bottom of the tank.

Paint Spray Booth for Electrostatic and Automatic Spraying

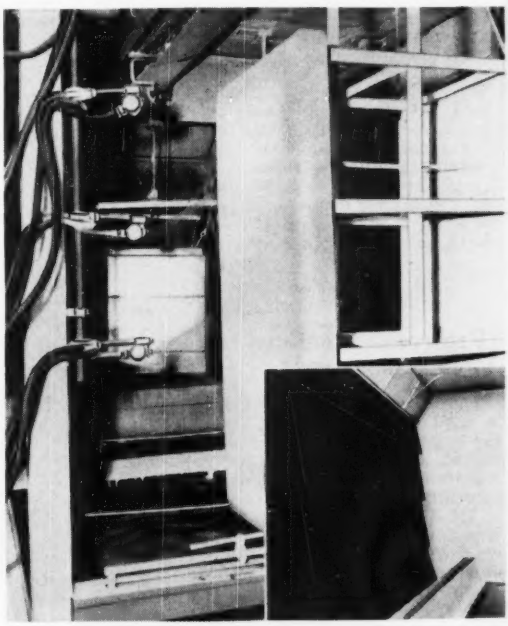
A notable reduction in maintenance is one of the outstanding advantages claimed for this new spray booth specially designed for electrostatic and other automatic low pressure spraying by the Despatch Oven Co., 619 S. E. 8th St., Minneapolis, Minnesota.

Among reasons for lower maintenance is the fact that air turbulence and stratification are eliminated and over-spray is cut to a minimum because of the uniformity of air flow attained over the entire face of the booth. This uniform air movement is accomplished by the even distribution of make-up air through filters covering the entire rear wall of the booth and by air outlets at four levels across the front curtain. The combination of low, uniform air velocity throughout the booth and low-pressure spraying through an electrostatic field is said to reduce paint losses considerably.

Another important feature of this booth is that filtered make-up air is supplied to the conveyor entrance and exit vestibules to provide effective seals against factory air and dirt.

Water up to 50 gallons per minute per lineal foot applied to the split curtain minimizes paint accumulation, and splashing is eliminated by a specially designed wet splash guard. Water flowing over the booth floor collects overspray and carries it to settling tanks for recovery. Paint that is carried past the front curtain is effectively separated from the exhausted air by specially designed water curtain scrubbers located behind the split curtain baffles.

The booth shown in operation is used for prime coating on the refrigerator line in the Seeger Refrigerator Company plant, St. Paul, Minnesota. A similar booth handles the finish coat. These booths are units of a 3200-foot conveyorized finishing system recently installed at the Seeger firm by the Despatch Oven Company. The system's capacity is 110 refrigerator cabinets and their component parts per hour.



Despatch Spray Booth for electrostatic, automatic paint spraying.

AO Twin Cartridge Respirator

A twin cartridge respirator specifically developed to provide protection against seven respiratory hazards through a basic

AO Twin Cartridge Respirator

face piece and seven interchangeable filters has been marketed by the American Optical Co., Southbridge, Mass. The seven filters are claimed to protect workers against a combination of all dusts, organic vapors, acid gases, combined acid and organic gases, ammonia, a combination of organic vapors and all dusts, and metal fumes.

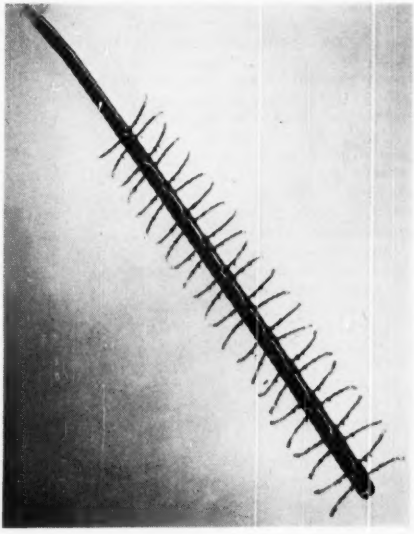
The basic face piece of the respirator is molded from durable rubber and has a "rolled" edge that curves inward to provide a snug fit without leakage. Other features include a flexible fitting brace for shaping the unit to individual features, a highly efficient inhalation and exhalation system, and increased field of vision through thinner filter cartridges.

Protective Coatings for Plating Racks

Shown in the accompanying illustration is a plating rack which has been used for a period of six months in a copper, nickel, and chrome plating cycle, including immersion in both caustic and acid solutions and temperature exposures up to 212 deg. F. Before being placed in service for the plating operations, the rack was dipped for insulation in a Geon plastisol, a material formulated by the chemical division of Michigan Chrome and Chemical Co. of Detroit, coating manufacturers, formulators, and distributors.

According to the manufacturer, the plastisol coatings will probably outlast the plating rack itself. Formerly, it was necessary to apply at least seven, and as many as ten, solvent solution coatings to a plating rack; and these coatings did not adhere well to metals and often failed after only two or three weeks of service. Only two plastisol coatings are now required for most cases; and in many instances, only one coat is necessary. The insulation shown in the illustration, which was applied by dipping and fusing, still adheres tightly after six months of service and shows little effect from the highly corrosive baths or high electrical currents to which it has been subjected during that period.

The use of plastisols based on Geon paste resin 121, a product of B. F. Goodrich Chemical Co. of Cleveland, has had a marked influence on the dip coating industry. Through control of compound viscosity, temperature of the article dipped, and speed of dipping and withdrawal, it is possible to apply coatings having thicknesses ranging from a few mils to ¼ inch or more per dip. Characteristics of Geon plastisol coatings include chemical resistance, abrasion resistance, controlled color choice, simplicity of processing, safety, and low cost.



Plating rack coated with Geon plastisol

Improved Ircolene No. 19

The International Rustproof Corp., 12511 Plover Ave., Cleveland 7, Ohio, has announced the use of the new "homogenizing" process for its non-drying, rustproofing Ircolene No. 19, which provides an extra tight adherent film over steel and other metals to prevent oxidation.

Used to protect non-ferrous metals from staining, tarnishing, and to maintain top condition while in storage, Ircolene No. 19 is said to be more effective, and its transparent coating does not detract from the original coating underneath, such as polished steel, and so on.

According to the manufacturer, humidity and salt spray tests on the improved product, with 95 per cent relative humidity at 95 deg. F., show a minimum film life of 5,000 hours. On salt spray tests (20 per cent at 95 deg. F.), minimum film life is 150 hours. On both tests a coating of zinc phosphate under Ircolene No. 19 more than doubled film life.

Model LSU-5 "Pint Sized" Filter Pump Unit

Sethco, 105-107 150th St., Jamaica 4, N. Y., has announced its Model LSU-5 "Pint-Sized" Filter Pump Unit, complete with motor, pump, and filter mounted on a laminated Bakelite panel and furnished with an acid and alkali-resistant hose.

Designed for continuous or intermittent filtration of all common industrial and electroplating solutions, the unit weighs 20 pounds and measures 16 x 12 x 12 inches high. The filter element may be rinsed or back-washed after use without loss of solution, and drainage is said to be complete.

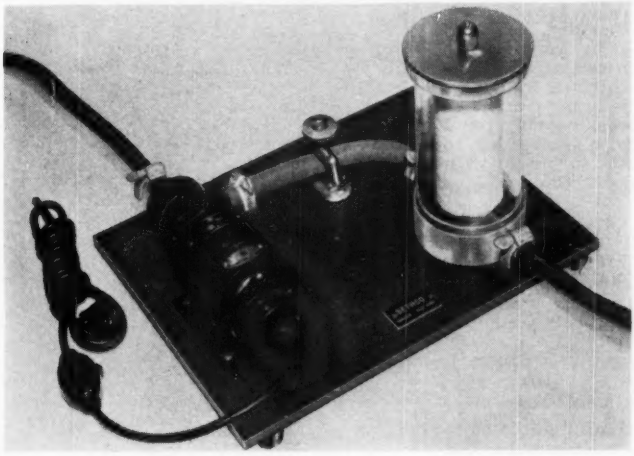
Dampney Silicone Coating Aluminum

The Dampney Company of America, Hyde Park, Boston 36, Mass., manufacturer of specialty protective coatings, has announced the addition to its line of Dampney Silicone Coating Aluminum for weather-exposed service at temperatures up to 750 deg. F. The coating utilizes silicone resins which combine high inertness and heat stability with unusually high water repellency and low moisture absorption to provide heat and weather-resistant surfacing of excellent durability.

According to the manufacturer, Dampney Silicone Coating is formulated to withstand either continuous exposure to heat or intermittent heating and chilling, and all condiions of weather exposure, as well as chemical-fume attack, and is recommended for application to such equipment as stacks, furnaces, boilers, heaters, ovens, steam lines, gas burners, and exhaust mufflers.

Its high spreading rate is claimed to permit rapid and easy application by brush or spray to any reasonably well-prepared iron, steel, galvanized, or other metal surface, either new or previously in service.

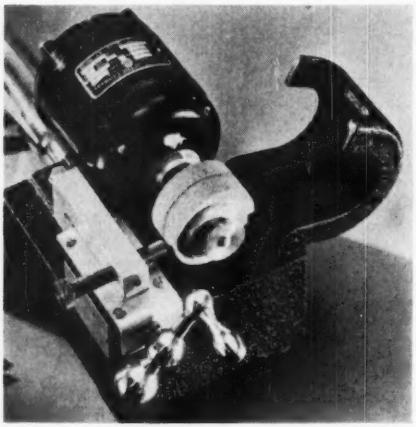
Surface coverage of 1,000 square feet per gallon is claimed. The material is said to dry in ½ hour to 3 hours.



Model LSU-5 "Pint-Sized" Filter Pump Unit

Taber Diamond Refacer

The Taber Diamond Refacer, product of the Taber Instrument Corp., 111 PF Goundry St., North Tonawanda, N. Y.,



Taber Diamond Refacer

has been announced for trueing small abrasive wheels ranging in size from 1¾ to 2¼ inches in diameter like the Calibrase and Calibrade Wheels used on the Taber "Abraser."

According to the company, operation of the unit is simple, necessitating only the raising of the hood and clamping the wheels on the mandrel connected to the vacuum unit of the Abraser, lowering the hood and moving the diamond back and forth across the face by turning the handle attached to the lead screw.

The wheel refacer is driven by a precision 115-volt 50/60 cycle, totally-enclosed motor, with diamond-bored bearings, and the base is equipped with connection to the powerful suction unit furnished with the Abraser to carry off the abrasive particles.

A long pointed diamond is used in the head of a point of the knurled headed screw that can be moved in and out to take just the right amount off the outside diameter of the wheel and to accommodate different sizes of wheels.

Spray Booth Coating

A removable plastic coating designed to simplify spray booth maintenance has been marketed by Specialty Coatings Laboratory, 1721 N. Water St., Milwaukee 2, Wisconsin.

The coating is applied to the interior surfaces of the booth by spraying or brushing, one gallon usually being sufficient to coat the interior of the average spray booth. The booth can be put into operation immediately after it is coated. Whenever an undesirable paint accumulation builds up, the plastic surface can be peeled off in sheets, removing with it all paint overspray and leaving a clean, dry booth.

The booth coating is completely waterproof and has found application to the water panel of water-wash booths. The coating is also said to be highly resistant to the regular solvents used in paints and lacquers. It is furnished in white and thus serves to increase spray booth illumination.

Stainless Steel Shipping Barrel

A stainless steel barrel for the shipment of nickel brighteners has been introduced by the Udylite Corporation, Detroit 11, Mich. Besides elimination of breakage, there are savings in freight, and less storage space is required because the barrels may be stacked. Barrels come in 15-gallon capacity and pumps can be easily and quickly fitted to the ends of the barrels.

Udylite Shipping Barrel

Tuf-On No. 58 Clear Coating

Of interest to finishers requiring a moisture resistant, flexible, clear coating for use on wire, assemblies, cable insulation, aluminum, brass, silver, and other metals, Tuf-On No. 58 Clear Coating has been introduced by the Brooklyn Varnish Mfg. Co., Inc., 50 Jay St., Brooklyn 1, New York.

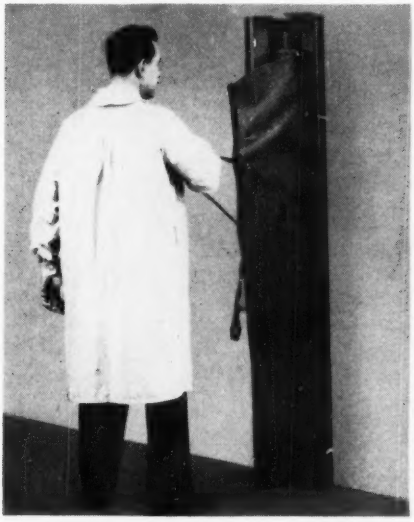
Clear, water white, based on vinyl resins, Tuf-On No. 58 can be applied by dip, spray, or brush, and will air dry in 10 minutes. Flexible, non-flammable, with high tensile strength, it is resistant to moisture, tarnishing, salt spray, acids, and alkalies.

Emergency Fire Blanket

Industrial Products Co., 2735 N. Fourth St., Philadelphia 33, Pa., has announced a roller-type fire blanket for use in chemical laboratories, paint spray lacquer rooms, and other locations where the hazard of fire is present.

Designed for fastening to the wall and neat and compact, the unit is always ready to use, allowing a man to envelop his body in a few seconds' time, cutting off the air and smothering the fire. One arm is put through the blanket loop and a turn of the body is all that is necessary to don the blanket. The blanket is fire-resistant and mothproof, and it is large enough to completely cover a person's body from his neck to his ankles.

The roller assembly is rugged, free-operating, and is mounted within a heavy gauge specially designed quick-opening metal container.



Emergency Fire Blanket

Illustration demonstrating the holding power of an Alnico "fist-size" magnet lifting a 30-pound pipe wrench

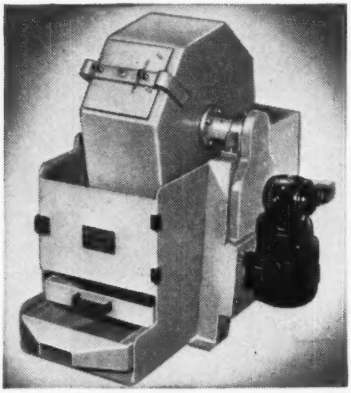
Alnico Permanent Magnets

The Ronald Eyrich Co., 2566 N. 49th St., Milwaukee 10, Wis., has announced the development of a line of powerful permanent magnets for quickly retrieving steel tools or equipment from holes, tanks, vats, wells, shafts, or narrow spaces between walls and boilers or machinery.

The magnets can be used under water and in other liquids and are utilized by chemical plants and metal processing shops for holding steel parts while performing pickling, spraying, dipping, and other processing operations. According to the manufacturer, the magnets require no electricity and will never weaken in normal use.

Small-Lot Variable Speed Deburring Barrel

Ease, speed, and convenience in tumbling small lots of stampings, die castings, and similar pieces are afforded by the Small-Lot Variable Speed Deburring Barrel announced by the Belke Manufacturing Co., 941-53 N. Cicero Ave., Chicago 51, Ill. The unit is said to be ideal for test runs to determine correct rotating speed, the kind and size of media or abrasive to be used, the best load size, and other factors.



Small-Lot Variable Speed Deburring Barrel

Well suited for mounting on a bench or small stand, the barrel is rotated by an enclosed variable speed drive which permits easy adjustment to any rotating speed between 13 and 39 r.p.m. Two sliding trays, the top one of which is perforated, permit quick, convenient separation of the work from the media.

Nox-Rust Vapor Wrapper Cartons

The Nox-Rust Chemical Corp., 2431 S. Halsted St., Chicago 8, Ill., announces that it has perfected a method for impregnating chipboard and corrugated cartons with the Nox-Rust Vapor Wrapper chemical.

Ideal for packaging all types of metal parts, tools, and appliances, it eliminates the need for temporary rust preventive coatings and inner wrappings. An invisible vapor released within the container is said to prevent the formation of rust on metal.

Model 5F-V-1 Foamite Fire Extinguisher

American-La France-Foamite Corp., Elmira, N. Y., has announced its 2½-gallon Model 5F-V-1 Foamite Fire Extinguisher of monotype construction silicon bronze which has an ultimate shell strength of 1400 pounds per square inch, is 65 per cent stronger than any previous drawn-shell model, twice as strong as a welded silicon bronze unit, and 2½ times as strong as a fabricated copper extinguisher.

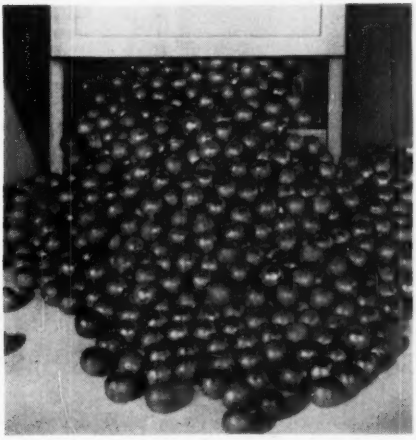
The extinguisher has a sealed stopper construction built into the top which prevents the chemicals from mixing until needed. Just a twist of the wrist releases the seal and the unit is ready for action.

Said to be ideal for tank trucks and other large vehicle units because it produces a fire-killing chemical foam equal to approximately ten times its own capacity, it stops oil and gasoline fires and prevents reflashing.

Model 5F-V-1 Foamite Fire Extinguisher

Udylite Forged Copper Ball Anode

Introduction of a forged copper ball anode to replace the cast copper ball



Udylite Forged Copper Ball Anodes

anode formerly used has been announced by L. V. Nagle, vice president in charge of sales of The Udylite Corp., Detroit 11, Michigan.

According to the manufacturer, the forged copper ball anode provides a finer, more even grain, is purer and forms less sludge in the plating bath, and is of uniform shape and weight.

"Lecite"

Marketed by the Electro Chemical Supply & Engineering Co., 750 Broad St., Emmaus, Pa., "Lecite" is a thermosetting synthetic resin cement which is inert to solvents, fats, oils, greases, alkalies, and acids, except strong chromic, nitric, and sulfuric over 60 deg. Baume, at temperatures to 375 deg. F. According to the manufacturer, Lecite is particularly useful for jointing acidproof brick and pipe in the construction of neutralizers, disposal units, tanks, process equipment, towers, fume ducts and stacks, floors, and so on.

Non-toxic and non-flammable, Lecite may be stored indefinitely at atmospheric temperatures and sets quickly to form a dense, shiny, shock-resistant joint. It possesses a compression strength in excess of 10,000 pounds per square inch.

Flame-otrol Series 1300 Combustion Safeguard

The Wheelco Instruments Co., 847 W. Harrison St., Chicago 7, Ill., has announced the Flame-otrol Series 1300 Combustion Safeguard which provides a complete self-checking cycle of operation from safe-start to safe-shut-off for any type of gas or oil-fired heating equipment.

Using the flame itself as the "electronic link" in a simple electronic circuit to provide instantaneous switching action, the Flame-otrol is capable of detecting the presence or absence of a gas or oil flame in any type of burner.

The unit is approved by both Underwriters' Laboratories and Associated Mutual Laboratories. Among its improved features are a guaranteed safe-start, and interchangeable plug-in units for increased program variety, for both manual or automatic ignition applications, easily adjustable to a wide selection of purge, preventilating, and ignition program cycle combinations.

Flame-otrol Series 1300 Combustion Safeguard

Pyro Surface Pyrometer

The Pyro Surface Pyrometer, an accurate and universally adaptable method for determining surface and sub-surface temperatures in almost every conceivable industrial plant or laboratory, features a 4-inch direct-reading indicator mounted in a rubber cushioned housing, thus offering great ease in reading, as well as long, durable service.

Pyro Surface Pyrometer

Product of The Pyrometer Instrument Co. Inc., Bergenfield, N. J., two distinct series of models offer either a rigid extension arm or a long 42-inch flexible arm suitable for use with any one or more of a selection of eight types of available thermocouples. Each series of instruments is available in four temperature ranges from 0-400 to 0-1200 deg. F., and all thermocouples may be interchanged without adjustment or recalibration.

Graco Paintmaster

Product of the Gray Company, Inc., 40 Eleventh Ave., N.E., Minneapolis 13, Minn., the Graco Paintmaster is an air-operated unit which pumps paint, enamel, lacquer, and other finishing materials direct from original containers and delivers a full supply to the spray head at fluid pressures lower than are now commonly used, thus reducing overspray losses.

A positive displacement, immersion-type gear pump in the Paintmaster, driven by a rotary air motor, delivers the paint directly to the spray head, or pumps it through circulating supply lines. Since no air pressure is exerted upon the paint itself, aeration is reduced to a negligible amount, thereby eliminating bubbles and pin holes in the finished surface, the manufacturer states. An agitator at the base of the pump keeps paint thoroughly mixed, maintaining uniform viscosity at all times. Paint in the circulating supply lines is ready to spray at a moment's notice.

The Graco Paintmaster is available in a portable 5-gallon model for both production and maintenance painting and in a 55-gallon size for pumping to the spray head or functioning as the supply source for a circulating paint system. To change colors or finishes, the units can be quickly flushed clean with a solvent.

Graco Paintmaster

Type "M" Heavy Duty Portable Dust Collector

Type "M" Heavy Duty Portable Dust Collector, available in 450, 900, and 1800 c.f.m. at high velocity, has been marketed by The Kirk & Blum Mfg. Co., 2816 Spring Grove Ave., Cincinnati 25, Ohio. It can be set up anywhere to serve one or several machines for any period of time or can be readily moved to meet changing needs. Said to be of greater capacity and more efficient than a smaller conventional collector, the unit is compact, self-contained, and ready to operate.

The Type M unit handles dust from

grinding, buffing, and polishing metal-working machines and similar dust sources, and consists of motor, exhauster,

Type "M" Heavy Duty Portable Dust Collector

centrifugal pre-cleaner, and steel wool filter after-cleaner.

In all sizes of the Type M Dust Collector, the principles of operation are the same. The dust-laden air is delivered to a small diameter high efficiency centrifugal pre-cleaner where all but the finest particles are removed. The air then passes through steel wool filter pads, three inches thick, for final cleaning.

The motor and exhauster are completely isolated from the dust and are completely fireproof. The housings are extra heavy. Exhausters are heavy dust industrial type, direct connected to a 3600 r.p.m. 220/440-volt motor. The motor is amply ventilated and readily accessible through a removable expanded metal panel. Dust receptacles are gasketed, sliding drawers, secured with a hand wheel to ensure a leak-proof seal.

Where conditions will not permit the re-entry of cleaned air into the working area, the filters are replaced with air-tight closures and the air vented to the outside. Exhaust stack connections can be furnished at top or any side of the unit.

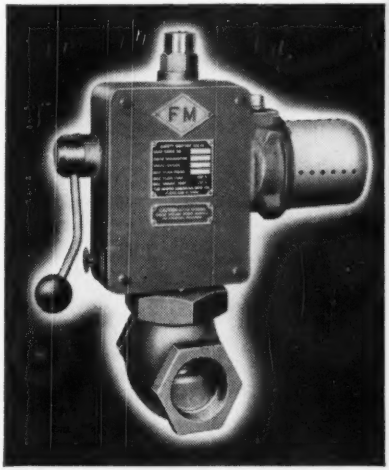
Where it is desired to return the cleaned air to the building during the winter months to conserve heat and to vent it to the ouside during the summer months to improve ventilation, the unit may be equipped with both exhaust stack and filters. The change is effected by merely turning a damper in the stack.

According to the manufacturer, maintenance is reduced to a minimum. The after-cleaner, readily accessible through an expanded metal door, usually requires cleaning not more than once in two weeks, dependng on usage.

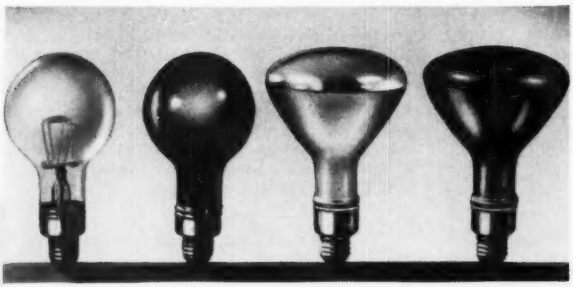
Series "21" Safety Shutoff Valve

The North American Manufacturing Co., 4455 E. 71st St., Cleveland 5, Ohio, has recently added to its line an Associated Factory Mutual Approved valve known as the Series "21" Safety Shutoff Valve. Designed for the protection of industrial furnaces against dangerous accumulations of gaseous or liquid fuels in the event of a power failure, the valve is claimed to stop the flow of any gas or liquid instantly when the current to its solenoid is interrupted. When the power is restored, the valve remains closed until the trouble is corrected, at which time the valve is reset manually.

Featuring a globe-type, soft-seating valve, the Series 21 can be obtained with an all-iron body and internals for use with corrosive gases or liquids and can be furnished with chain reset wheels for



Series "21" Safety Shutoff Valve



Amplex Infra-Red Heat Lamps

overhead mounting and with auxiliary switches for independently-powered alarm systems. Available in sizes from ¾ to 6 inches, the valve may be equipped with solenoids of 110, 220, 440 volts and 60, 50, and 25 cycles.

Amplex Infra-Red Heat Lamps

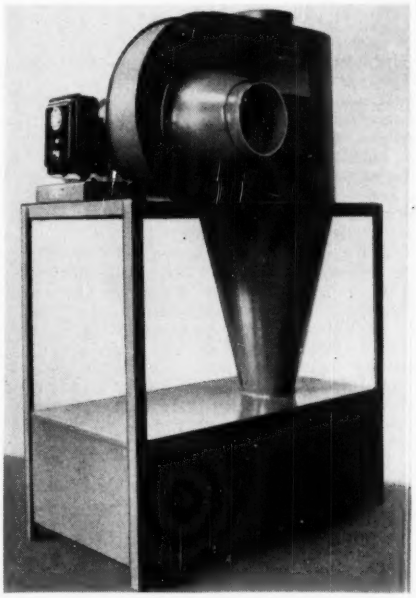
A 500-watt sealed-beam industrial heat lamp, manufactured by Amplex Corp., 111 Water St., Brooklyn 1, N. Y., incorporates a new type of tungsten filament that is said to have been especially constructed for infra-red heat lamp use, pretested for twist and sag, and built with a protective supporting structure never before applied to heat lamps. The inside of the bulb is lined with pure polished silver that acts as a built-in reflector that never needs cleaning since it is hermetically sealed and protected from dust, dirt, and fumes.

Other Amplex heat lamps announced include sizes from 125 watts and up, each equipped with an all-mechanical base-locking construction that permanently locks the glass bulb to its base and is claimed to keep it locked no matter how high or sustained the temperature to which it is subjected.

Filterless Dust Collector

The "Dustkop" Model 30N50 Dust Collector shown herewith, product of the Aget-Detroit Co., 207 Main at Washington St., Ann Arbor, Mich., has a capacity of 3,630 c.f.m. (velocity, 10,400 f.p.m.) yet requires only a 28 x 49-inch floor space and measures 82 inches high overall. A self-clearing paddle wheel fan direct driven by a 5 h.p. continuous duty motor is said to provide for the handling of dust from four grinding, buffing or polishing wheels, 19 to 24 inches in diameter; dust from multiple abrasive or sanding belts; dust from conveying and packaging operations; dust from chemicals; and so on.

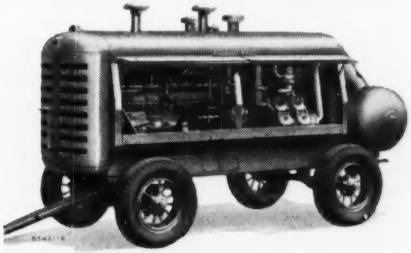
The dust-laden air enters the unit at the 8-inch diameter inlet. Dust, dirt, chips, shavings, and so on, are removed in the cyclone separator and deposited in the dust storage compartment which has a 12 cubic foot capacity and comprises the base of the dust collector. The cleaned air with any toxic fumes, objectionable smoke, and so on, is exhausted to the outdoors through the outlet at the top of the cyclone.



"Dustkop" Model 30N50 Dust Collector

Mobil-Air Compressor IKA-500

For users who prefer full Diesel-engine drive for their portable compressors, a 500 c.f.m. Mobil-Air has been announced



Mobil-Air Compressor IKA-500

by Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y. The engine is the International-Harvester heavy-duty UD-24 which starts easily as a low compression gasoline engine and after a short warmup period is shifted to full Diesel operation by means of a single lever.

The floating-speed regulator of the Mobil-Air slows down the compressor to the lowest practical working speed that compresses just enough air to hold the pressure, thus resulting in greater fuel savings and higher average air pressures. Full 500 c.f.m. capacity is delivered at rated 100 p.s.i. pressure. Other features include two-stage air-cooled compressor (with a choice of three engines), hydroshift flex-disc clutch, channel valves, and sturdy running gear and mountings. In addition, the compressor is said to possess a more efficient air cleaner, easy to service.

Ionac Resin C-212

Production of a new synthetic cation-exchange resin, designated as Ionac Resin C-212, has been announced by the Ion Exchange Products Department of American Cyanamid Company, 30 Rockefeller Plaza, New York 20, N. Y. This new product is a monofunctional, non-phenolic resin, with medium-high exchange capacity and improved physical and operating characteristics.

Manufacturers of water-treating equipment will particularly welcome the news that this new resin exhibits essentially no color throw, neither in high-PH waters, nor on prolonged contact with water. For example, when two samples were soaked, one in demineralized water and one in 1 per cent caustic, for 18 hours, both gave an APHA color reading of 30; prolonging the soaking to 66 hours still produced no undesirable color. Preliminary tests indicate that Ionac Resin C-212 possesses another highly desirable characteristic—resistance to the chlorine found in most municipal water supplies.

Recommended flow rate of high-solids influents is 2 to 4 gal. per minute per cubic foot; on low-solids influents, flow rates as high as 10 g.p.m. per cubic foot have been successfully used.

Life-in-use is excellent. On the hydrogen cycle, samples have been subjected to more than 1300 cycles of use and regeneration without failure. In another test, two samples were run through 390 cycles on the sodium cycle, one at room temperature and the other at approximately 176 deg. F., and using a difficult influent. After 390 cycles, the sample tested at room temperature had 98 per cent of its original capacity, while the sample tested at 176 deg. F. had 94.6 per cent. In addition, for the last 150 of the 390 cycles, the pH of the influent was raised to above 10. From the capacities quoted above it can be seen that the higher pH of the influent had no ill effects on the resin.

Try on approval

McKeon's

Zinc-Brite

for purifying your zinc plating solution.

It *is* compatible with *your* brightener.

Sulphur Products Co.

Greensburg 6, Pa.

"Rugalaka"

The Lacquer and Chemical Corporation of Brooklyn, New York, has introduced a protective coating called "Rugalaka". This finish resembles the broadloom pattern of a rug or what might be considered an inverse hammered finish, and may be air-dried or baked to a smooth, glossy finish. Available in many colors, it can be used to finish typewriters, lamp bases, vacuum cleaners and general castings.

"Scotch" Filament Tape No. 890

Product of the Minnesota Mining and Manufacturing Co., 900 Fauquier St., St. Paul 6, Minn., the "Scotch" Filament Tape No. 890 has been designed for extra heavy duty packaging, and sticks immediately on contact.

Made in 72-yard lengths and in standard widths of ½, ¾, and 1-inch and other widths on special order, the tape has an acetate film backing with glass filaments instead of rayon. According to the manufacturer, Tape No. 890 provides 500 pounds of tensile strength per inch of width, its shock resistance is twice as great as the two previously announced filament tapes, and its tear resistance is far greater than can be measured on the ASTM-approved Elmendorf tear tester.

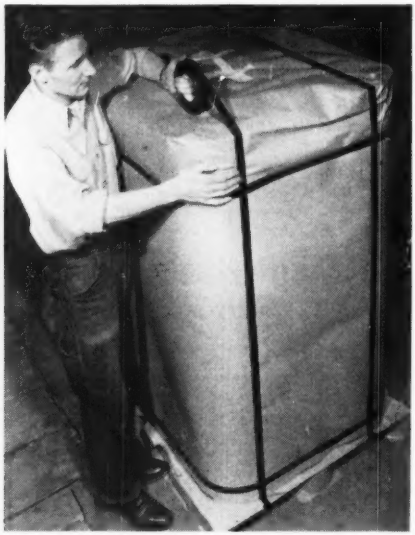


Illustration shows "Scotch" Tape No. 890 being used to strap fibre-board cartons

Tesco Metal Processing Chemicals

Tesco Chemicals, Inc., Atlanta 2, Ga., has announced the following three metal processing chemicals:

No. 25 Non-Smutting, Non-Sudsing, Non-Etching Alkali Cleaner for Aluminum which removes oil, grease, dirt, drawing compound, and so on, in still tanks or washing machines, leaving the metal bright and clean. It is self-inhibiting and does not etch aluminum; however, with a slight modification of formula, aluminum may be etched to the degree desired. After it reaches the desired point, further etching is inhibited. It also may be used to strip most paints from aluminum, with the exception of vinyls. After stripping, the metal is left bright and clean. It may be used to clean and strip all metals, and is free rinsing.

No. 12 Phosphoric Process processes steel, aluminum, zinc, and cadmium in the same solution at the same time. This treatment deposits on these metals a very fine-grained, smooth, hard, tight, inert crystal which inhibits the metal against corrosion. The crystal holds the paint with the tightest possible grip. The application is rapid and easily controlled. Cost per unit of metal treated is very low.

No. 42 Phosphoric Cleaner and Conditioner was designed to be used at room temperature without necessity for any or a minimum of heating facilities. The action on the metal is very rapid. Heat speeds and cold slows it. It removes oil, grease, dirt, corrosion, slightly etches and deposits a corrosion-inhibiting and paint-bonding coating on the metal. It was originally designed for use on aluminum. The manufacturer states that it will perform equally as well on steel and all other metals with the exception of zinc. It brightens copper, bronze and brass, removes corrosion, and bonds paint to terne-plate and lead. It is a very free rinsing material.

Cummins 6-Inch Polisher

A lightweight portable electric tool for rubbing and polishing metals and similar surfaces has been announced by the Portable Tools Division of Cummins Business Machines, Inc., 4740 Ravenswood Ave., Chicago 40, Ill. Outstanding

Cummins 6-Inch Polisher

features include its 4¼-pound weight; the free speed of 1300 r.p.m., said to be ideal for polishing fine finished surfaces; a patented swivel side-handle which can be positioned at any point on the tool for greatest ease of operation, either right or left-hand; and a balanced design which prevents the tool from tipping over, to mar or scratch the surface.

Specifications of the Cummins 6-Inch Polisher include a die cast aluminum frame of streamlined design; universal type motor for operation on 115 volts, either a.c. or d.c.; dynamically-balanced armature with insulation baked on for full protection and durability; planetary precision gearing of alloy steel; ball and Oilite bearings in proper position for smooth, quiet operation; 6-inch diameter backing pad; two-pole switch, trigger type, for effective control and maximum safety; ventilating fan to keep the tool comfortably cool; 10-foot 3-conductor rubber-covered cord.

Unacote

A fast-drying finish known as Unacote which can be used on practically any surface or material by any of the usual methods is available from the Arnaud Corp., 17 John St., New York 7, N. Y. Claimed to be the fastest-drying finish on the market, it dries in 6 to 12 minutes.

Unacote is washable, and one coat is said to be sufficient for most surfaces, providing complete coverage and full sealing against water, weather, and hard use. Rubbing is reduced to a minimum, and in many cases is unnecessary.

On metals, Unacote is said to be an effective tarnish and rust preventive. On heavy traffic areas, such as door entrances, aisles, and elevator floors, it is reported that it stands up for 12 to 30 months. It is available in clear lacquer, colors, aluminum, and luminous.

Paraplex G-60 Plasticizer

Characterized by high plasticizing efficiency, light color and clarity, low viscosity, and excellent compatibility with solution-grade vinyls and designated as Paraplex G-60, a polyester plasticizer has been put into production by the Resinous Products Division of Rohm & Haas Co., Washington Square, Philadelphia 5, Pennsylvania.

As a plasticizer in polyvinyl chloride compounds, G-60 is said to bring low temperature flexibility to polyvinyl sheet and film stocks. In part because of its low viscosity, the manufacturer states that it has demonstrated its usefulness in the preparation of vinyl dispersion compounds such as organosols and plastisols.

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PRODUCT LITERATURE

The publications listed in this section may be obtained free upon written request on company letterhead to the manufacturers concerned. Your courtesy in mentioning PRODUCTS FINISHING when requesting copies of these publications will be sincerely appreciated by the manufacturer and the publisher of this magazine.

Technical Bulletin No. P-113, detailing solubility, surface tension effects and stability data of three industrial surface active agents, is available from Monsanto Chemical Company, St. Louis 4, Missouri.

Spray Booth Coating. A technical data sheet prepared by the Specialty Coatings Laboratory, 1721 N. Water St., Milwaukee 2, Wis., describes in detail its spray booth coating, a removable plastic coating designed to simplify spray booth maintenance, in addition to providing instructions for use, and prices of coating material.

Unit Dust Collectors. The Kirk & Blum Mfg. Co., 2816 Spring Grove Ave., Cincinnati 25, Ohio, has issued a four-page leaflet providing complete engineering data on its Type "M" Unit Dust Collectors. A table of capacities and sizes is included.

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241 Brunswick St. Hammond, Ind.

Amersil Heaters, products of the Amersil Co., Inc., Engineering Dept., 900 Passaic Ave., East Newark, N. J., are described and illustrated in a four-page folder. Included are price lists and specifications of these electric immersion heaters for pickling, electroplating, and other chemical processes.

Mechanical Finishing. The Roto-Finish Process for mechanical finishing, deburring, polishing, Britehoning, and coloring is described in an illustrated bulletin available from the Roto-Finish Co., 3436 Milham Rd., Kalamazoo, Mich. Various models of Roto-Finish machines, together with process outlines, materials, and accessory equipment including Roto-Finish chips and compounds, are illustrated and described.

Tenite Injection Molding, a procedural guide to the injection molding of Tenite I and Tenite II, Eastman cellulose acetate and cellulose acetate butyrate thermoplastics, has been published in an enlarged edition by the Tennessee Eastman Corp., Kingsport, Tenn. The 55-page book contains detailed data on such pertinent matters as choice of material, proper product design, injection-molding machines, mold design and construction, and various finishing operations.

"Modern Metal Finishing," published by the Electrochemicals Dept., E. I. du Pont de Nemours & Co., Wilmington, Del., and containing timely and useful articles about technical developments in the treatment of metals (electroplating, descaling, metal cleaning and heat treating) is again available.

Willson Safety Equipment Catalog. In addition to providing product information on the company's line of eye and respiratory equipment, this 64-page book, avail-

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able from Willson Products, Inc., Reading, Pa., contains a fund of technical and reference material which has been included to help the user select the proper type and style of equipment for the specific occupational hazard involved and to provide information on its use and care. Charts throughout the catalog show at a glance the comparative features of various styles and aid in the selection of the most comfortable style for the user.

Heavy Duty Greaseless Compound. The Roberts Rouge Co., Stratford, Conn., has available a leaflet outlining facts about its Heavy Duty Greaseless Compound and its new "Saver-bottom" compound container.

Lead and Lead Lined Products. Knapp Mills Incorporated, 121 Broad St., New York 4, N. Y., has published an eight-page two-color catalog describing its lead and lead lined products and equipment, chemical and process equipment, and lead burning and construction services.

"3/1000 of an Inch," the title of an eight-page booklet depicting the devastation wrought by the lack of painting and ways to combat it, can be obtained from the National Paint, Varnish and Lacquer Association, Washington, D. C.

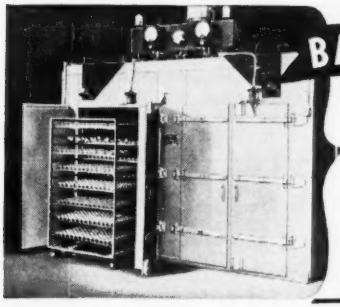
Portable Plating Equipment. A price list for Rapid Metal Coaters and allied equipment and supplies is available from Rapid Electroplating Process, Inc., 1414 S. Wabash Ave., Chicago 5, Ill. Equipment for repairing all types of plated or hot dipped coatings and applying various metallic coatings is listed and described briefly. Sets for applying most of the common metals are available.

Chemical Specialties Bulletin. A four-page bulletin describing the applications and characteristics of Acidulum, an acid-proof plastic coating, and Greas-Olve, a liquid emulsifying and grease and oil-removing solvent, is available from Service Industries, 2103 E. Somerset St., Philadelphia 34, Pennsylvania.

Arco Microknife, a precision-built instrument for testing scratch hardness and adhesion of paints and other coatings, is described in a leaflet released by the Henry A. Gardner Laboratory, Inc., Bethesda 14, Maryland.

Research Laboratory Brochure. The Administration Division of The Franklin Institute Laboratories for Research and Development, Benjamin Franklin Parkway at 20th St., Philadelphia 3, Pa., have published a brochure describing the greatly expanded facilities of its laboratories. Containing 40 pages and profusely illustrated, the booklet outlines some of the investigations for which the Institute Laboratories are equipped.

Resin Guide. An up-to-the-minute guide to its complete line of resins for use in surface coatings and printing inks has



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been issued by the American Cyanamid Co., Coating Resins Dept., 30 Rockefeller Plaza, New York 20, New York. This guide is devoted to tabulating the physical and chemical properties of the Rezyl Alkyd, Melmac Melamine, Beetle Urea, Cycopol Copolymer, Phenac Phenol, and Teglac Dibasic Acid Modified resins.

"Wakefield Amalgamated" Homogeneous and Expanded Lead-Lined Products. Lead Lined Iron Pipe Co., Wakefield, Mass., has issued Catalog G which presents 36 pages of descriptions, illustrations, and prices of its chemical and process equipment, lead-lined products, and lead-burning and construction equipment. In addition, a two-page guide is included which lists the chemicals with which lead is most frequently employed.

Miller Rotary Plate Rod Agitators which permit higher current densities, prevent burning, and eliminate adherence of gas bubbles to the cathode are the topic of a mailing piece distributed by the J. C. Miller Co., 55 Mt. Vernon N.W., Grand Rapids, Michigan.

Bulletin No. 218 which provides a cutaway illustration of the Series "21" Safety Shutoff Valve together with complete engineering information has been issued by The North American Manufacturing Co., 4455 E. 71st St., Cleveland 5, Ohio.

Barrel Tumbling Manual. Frederick Gumm Chemical Co., 538 Forest St., Kearny, N. J., has released a manual for bulk finishing of small parts which includes: basic information on barrel finishing with numerous practical instructions and suggestions; specific data on deburring with metallic and non-metallic media; and self-rolling parts. Considerable information is also presented on burnishing, care of burnishing medium, calculation of barrel sizes, void space volume, and so on.

"The Story of the Chemicals You Live By," a 16-page booklet concisely and clearly describing eight major groups of chemical products and depicting their diverse utilization throughout American industry, has been issued by the Diamond Alkali Co., 300 Union Commerce Bldg., Cleveland 14, Ohio. Written in simple, non-technical terms and attractively illustrated, the booklet reviews soda ash, caustic soda, chlorine, bicarbonate of soda, silicates, calcium carbonates, chromates, and specialty chemicals, pointing up the economic significance of each group.

Centrifugal Chemical Pumps. Published by Worthington Pump and Machinery Corp., Harrison, N. J., Bulletin W-350-B11 describes and illustrates some of Worthington's centrifugal pumping equipment used in the chemical process industries; explains the Worthington Mechanical Seal, specially designed to prevent leakage of corrosive liquids; and describes Worthite, a corrosion resistant metal.

NEW BOOKS

Principles of Electroplating and Electroforming. By William Blum and George B. Hogaboom. Revised Third Edition. Published by McGraw-Hill Book Company, 330 West 42nd Street, New York 18, N. Y. 445 pages. Illustrated. Cloth binding, board covers. Price, $6.00.

For 25 years, "Principles of Electroplating and Electroforming (Electrotyping)" by Blum and Hogaboom has served as an excellent text book for persons interested in any phase of the plating industry. The book has been particularly

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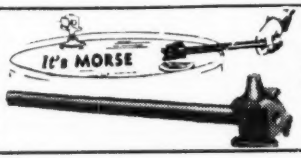

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helpful for individuals who have had no formal scientific education, serving as a foundation upon which further study could be based. The present edition summarizes and presents in logical arrangement current electroplating theory and practice, and is designed to be of great practical value to electroplaters, chemists, and engineers concerned with plating operations.

Methods of plating each of the commonly-used metals are described, and methods of analysis of plating solutions to determine the critical constituents of each are grouped in one chapter of the book.

Also included in the book are chapters covering: principles of chemistry, electricity, and electrochemistry; selection, specification and inspection of electrodeposits; preparation for electroforming and electrotyping; plating tanks and equipment; electrical equipment; alloy deposition.

Boron Trifluoride and Its Derivatives. By Harold Simmonds Booth and Donald Ray Martin. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 315 pages. Illustrated. Cloth binding, board covers. Price, $5.00.

This book presents information to facilitate investigations made with boron trifluoride.

The material has particular value for research chemists in the petroleum industry, the plastics and polymer industry, for organic chemists interested in condensation and polymerization reactions in which boron trifluoride is used as a catalyst, and for chemists in the electroplating industry, the steel industry, and ceramics. Of special interest to electroplating industry chemists are Chapters 5 and 7, entitled respectively, "Fluoboric Acids and Their Salts," and "Analysis of Boron Trifluoride and Its Derivatives."

Several leading companies gave the authors lists of their patents in this field, and the Harshaw Chemical Company, first commercial producers of boron trifluoride and boron trifluoride-ethyl etherate, put at the authors' disposal all their experience and records.

Paints, Varnishes, and Related Products. Published by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. 12 pages. Price, 5 cents.

Compiled by the National Bureau of Standards, this Simplified Practice Recommendation R144-49 is a schedule of specifications for paints, varnishes, and related products (colors and containers), which is recommended to industry as a useful standard of practice.

The Story of Magnesium. By W. H. Gross. Published by the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. 262 pages, 5¼ x 7¾ inches. 100 illustrations. Cloth bound. Price, $2.00.

Designed to be profitable to the reader, this book presents the story of magnesium, tells in detail how to cast, machine, rivet, and weld this metal, and explains many of the processes used in the manufacture of hundreds of vital products for industry, transportation, and for the home.

By combining simplicity, accuracy, and readability, and by using over 100 photographs, charts and drawings to assure complete understanding, Mr. Gross has provided an excellent information source to the non-technical, non-professional reader on magnesium, a metal that is fast becoming of age.

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Will BUY your dirty THINNERS and SOLVENTS. Send sample or letter giving approximate contents and solids. Box No. 14, c/o Products Finishing, 431 Main Street, Cincinnati 2, Ohio.

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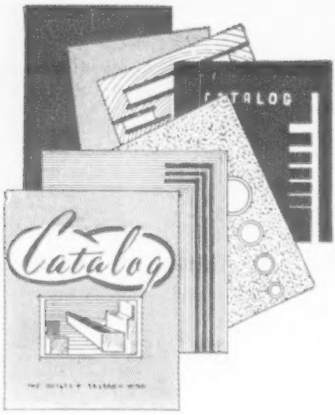

Catalogs

FOR YOUR LIBRARY

To obtain copies of the catalogs listed here, indicate on the coupon the number of the item in which you are interested and mail as directed.

1. Clear Dip

Instructions outlining a simple dipping process for producing a clear, bluish coating directly on zinc die castings are available in Unichrome Dip Bulletin 12, published by United Chromium, Inc., New York 17, New York.

2. Precious Metal Plating

A 20-page booklet issued by A. Robinson & Son, New York 2, N. Y., presents in usable form accepted methods applied in the electroplating of such articles as watch cases, insignia, jewelry, novelties, pen and pencil parts.

3. Polishing Accessories

The Manderscheid Co., Chicago 7, Ill., has issued Bulletin 103 describing the Presto line of work holding spinners, tube polishing machines, emery troughs, wheel rakes, and other polishing room accessories.

4. Dust Collectors

Catalog No. 34, published by the Torit Mfg. Co., St. Paul, Minn., outlines methods for collecting and cleaning dust-laden air from around industrial machines and includes complete information on the Torit line of self-contained and cyclone type dust collectors.

5. Copper Anodes

A folder describing "Flat-Top" copper anodes may be obtained from Wagner Brothers Inc., Detroit 3, Michigan.

6. Strippable Plastic

Technical Data Bulletin No. T504, describing Copeel Strippable Plastic Coating, is being issued by the Maas & Waldstein Co., Newark 4, New Jersey.

7. Industrial Chemicals

A bulletin issued by the Harshaw Chemical Co., Cleveland 6, Ohio, lists alphabetically the chemicals supplied by the company. Specific listings of chemicals supplied to industries such as electroplating, ceramics, scientific laboratories, and so on, are included.

8. Polishing Wheels and Belts

"Setting Up Metal Polishing Wheels and Belts" is the title of a 44-page handbook obtainable from the Norton Co., Worcester 6, Mass., which contains many worthwhile tips for increasing production and cutting polishing costs.

9. Centerless Finishing Machines

"The Production Story" is the title of a folder which briefly illustrates and describes the many different centerless buffing and polishing, surfacing and straight line finishing machines manufactured by the Production Machine Co., Greenfield, Massachuetts.

10. Woven Wire Conveyor Belts

A 56-page illustrated booklet describing Cambridge belt construction and use has been issued by the Cambridge Wire Cloth Co., Dept. A-1, Cambridge 1, Maryland.

11. Flock Color Card

A color card illustrating 20 stock shades of flock in rayon, cotton, and wool can be obtained from the Claremont Waste Mfg. Co., Claremont, New Hampshire.

12. Spray Finishing Equipment

Catalog No. 97 prepared by the Binks Manufacturing Co., Chicago 12, Ill., contains complete data on spray guns, spray booths, air compressors, painting outfits, extractors, respirators, hose, and other products.

13. Rotary Automatic Polishing and Buffing Machine

Bulletin No. 45, issued by Hammond Machinery Builders, Inc., Kalamazoo, Mich., includes illustrations, descriptions, and specifications of the Hammond "Super" Rotary Automatic for grinding, polishing, buffing, and deburring.

14. Cleaning Machinery

An illustrated folder descriptive of its complete line of machinery for washing, rinsing, and drying metal parts is now being offered by the Cincinnati Cleaning and Finishing Machinery Co., Ironton, Ohio.

15. Abrasive Belts

Thirteen production reports from various manufacturers citing advantages of Resinall Metalite Belts are contained in a folder issued by Behr-Manning, Troy, New York.

16. Metal Degreasing

The Chlorine Products Division, Electrochemicals Dept., E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del., has issued a 10-page illustrated booklet outlining standard practices for degreasing metals with chlorinated solvents.

17. Metal Coating Specifications

"Specifications and Tests for Electrodeposited Metallic Coatings" is the title of a booklet which can be obtained from The International Nickel Co., Inc., New York 5, New York.

18. Hammer Finish

A technical data sheet published by the Standard Varnish Works, Staten Island 3, N. Y., describes Alpo-33A Hammer Finish.

19. Abrasive Grains

The Exolon Co., Tonawanda, N. Y., has issued a folder describing Exolon abrasive grains and polishing procedures applicable to various industry groups.

20. Metal Preparation

The Neilson Chemical Co., Detroit 7, Mich., has issued the following bulletins describing Neilson pre-paint treatments: Alumiprep, a surface treatment for aluminum; Prep-n-Cote, a cleaning and phosphate coating for steel or aluminum to be used in spray washing machines; Metalprep, a rust remover and metal cleaner for steel, aluminum, or galvanized iron.

21. Organic Finishing

A 12-page technical bulletin outlining basic points to be considered in the planning of a complete organic finishing system has been prepared by Peters-Dalton, Inc., Detroit 12, Michigan.

22. Cleaners and Paint Strippers

Six technical bulletins describing paint strippers, cleaners, and phosphate coating materials are being distributed by Chemco Products Co., Inc., Chicago 19, Illinois.

23. A.C. Generators

A bulletin describing the construction and operation of Columbia alternating current generators is being issued by the Columbia Electric Manufacturing Co., Cleveland 14, Ohio.

24. Clear Lacquer

Stanley No. 45X-70 Clear Gloss Synthetic, a water-white coating for silver, or brass, chromium, steel, iron, magnesium, and zinc, is described in a data sheet available from The Stanley Chemical Co., East Berlin, Connecticut.

25. Abrasive Belt Head

Bulletin No. 17 issued by The Packer Machine Co., Meriden, Conn., describes Model No. 18 universal abrasive belt head and contains suggested applications of the device.

26. Finishing Systems

The Despatch Oven Co., Minneapolis 14, Minn., has available Bulletin 51-E descriptive of its finishing systems.

27. Uses for Paint Finishes

The National Paint, Varnish and Lacquer Association, Inc., Washington, D.C., has available an eight-page pamphlet entitled "Where Isn't A Finish."

28. Cabinet Ovens

The Young Brothers Co., Detroit 7, Mich., has available Bulletin 8-S presenting information on electric, gas, or steam heated laboratory, standard, and special cabinet ovens.

29. Finishing Equipment

J. Holland & Sons, Inc., Brooklyn, N. Y., has published Folder "M" describing finishing equipment furnished by the company.

30. Troxide Bulletin

Troxide, dry acid salt compound for pickling prior to porcelain enameling, is described in a technical bulletin issued by MacDermid Inc., Waterbury 88, Connecticut.

31. Mechanical Finishing

Equipment and methods for mechanical finishing, deburring, polishing, Britehoning, and coloring various metals is described in an illustrated bulletin available from the Roto-Finish Company, Kalamazoo, Michigan.

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Index to Advertisements

Abrasive Products, Inc. 101
Acme Mfg. Co. 75
Allied Research Products, Inc. 87
Alsop Engr. Corp. 62
American Chemical Paint Co. 47

Baker & Co., Inc. 6
Baughn Chemical Products Co. 26
Better Finishes & Coatings, Inc. 76
Binks Mfg. Co. 104, 105
Blakeslee & Co., G. S. 73

Cambridge Wire Cloth Co. 71
Carborundum Co. 9
Chemco Products Co., Inc. 44
Chromium Process Co. 69
Cincinnati Cleaning & Finishing Mchry. Co. 45
Claremont Waste Mfg. Co. 27
Codman Co., F. L. & J. C. 57
Cowles Chemical Co. 10

Davis-K-Products Co. 72
Detrex Corp. ..... Fourth Cover
Detro Mfg. & Sales Co., Inc. 30
Dixon & Rippel, Inc. 123
DuBois Co. 53
duPont de Nemours & Co., E. I., Electrochemicals Div. 51

Hammond Mchry. Builders, Inc. 31
Hanson-Van Winkle-Munning Co. 3
Harrison & Co., Inc. 119
Holland & Sons, Inc., J. 46
Hygrade Food Products Corp., Boothcote Div. 28

Industrial Filter & Pump Mfg. Co. 40
International Nickel Co., Inc. 64, 65

Jensen Specialties, Inc. 37

Kalamazoo Tank & Silo Co. 42
Keystone Emery Mills 120
Kirk & Blum Mfg. Co. 55
Kold-Hold Mfg. Co. 77
Korb-Pettit Wire Fabrics & Iron Works, Inc. 63

MacDermid, Inc. ..... Third Cover
Mahon Co., R. C. 48, 49
Manderscheid Co. 43
Mitchell-Bradford Chemical Co. 93
Morse Mfg. Co., Inc. 122
Mosher Co. 59
Murray-Way Corp. 67

Nielson Chemical Co. 7
New York Blower Co. 85
North American Electric Lamp Co. 24
Norton Co. 2

Oakite Products, Inc. 1
Optimus Equipment Co. 61

Packer Machine Co. 81
Parker Rust Proof Co. 18, 19
Peters-Dalton, Inc. 41

Quinn Co., Nelson J. 8

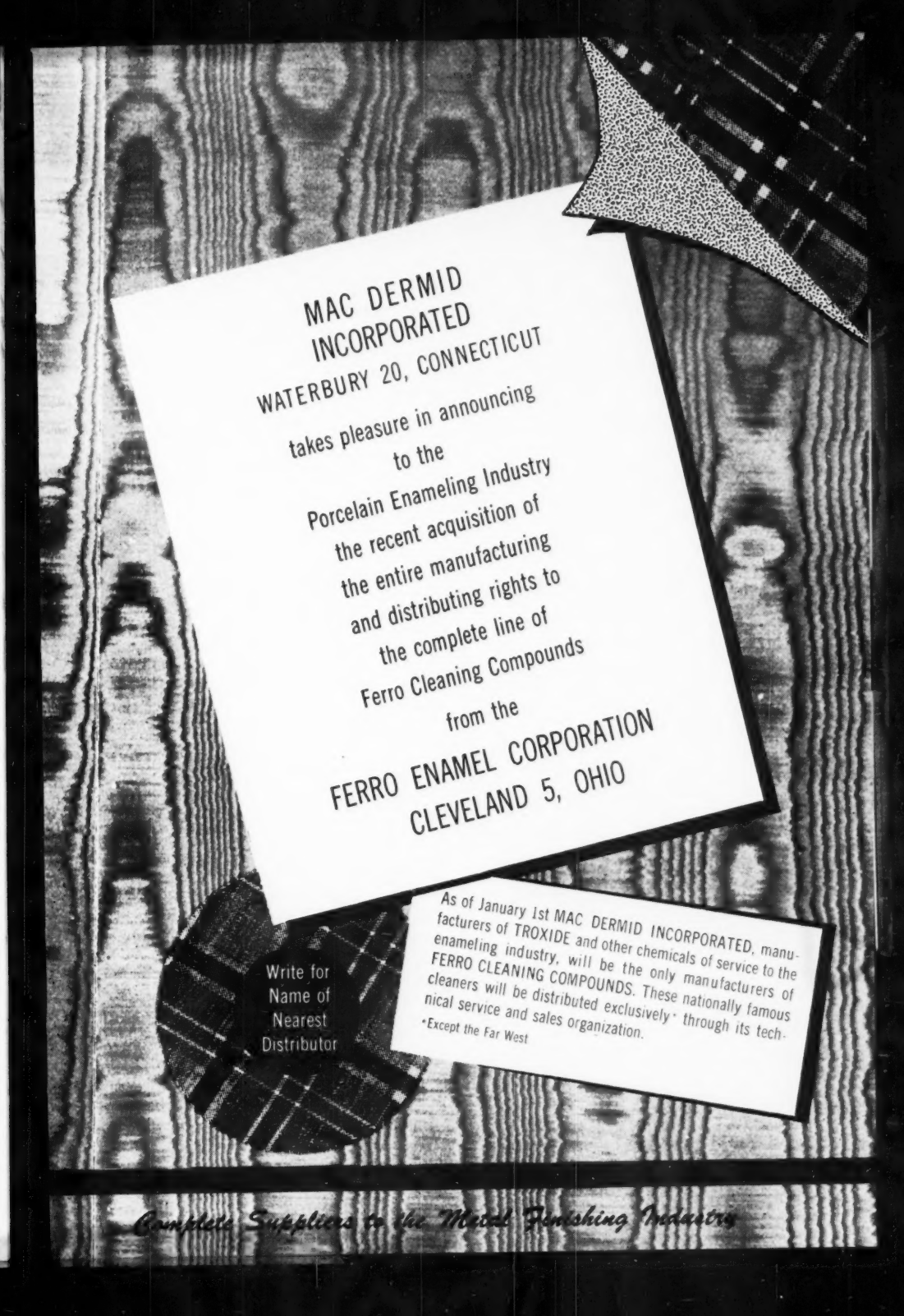
Randolph Products Co. 23
Ransohoff, Inc., N. 29
Rayon Processing Co. of R. I. 95

Sherwin-Williams Co. 34, 35
Solvents Recovery Service, Inc. 120
Standard Varnish Works ..... Second Cover
Stanley Chemical Co. 4
Stevens, Inc., Frederic B. 25
Striplastic Co. 38
Sulphur Products Co. 117
Surety Rubber Co. 22

Torit Mfg. Co. 99

Udylite Corp. 39
United Chromium, Inc. 97

Young & Bertke Co. 79
Young Bros. Co. 121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